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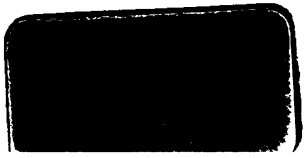
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A

TREATISE ON DIET.

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A

TREATISE ON DIET,

COMPRISING THE

NATURAL HISTORY, PROPERTIES, COMPOSITION, ADULTERATIONS AND USES

OF THE

VEGETABLES, ANIMALS, FISHES, &c.,

USED AS FOOD.

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PREFACE.

SEVERAL works on diet have lately been published in this country, and some of these have deservedly attained considerable celebrity for the accurate and enlightened account which they give of dietetics. There exists, however, no modern English work, in which alimentary substances are described individually as to their natural history, general properties, chemical constitution, adulterations and uses, accompanied with an exposition of the principles of diet. Mr. Donovan's very useful work on Domestic Economy is to a certain extent an exception, although it does not completely

fulfil this object, more particularly as regards its utility to the student and medical practitioner. The present treatise has therefore been attempted, and, though concise, the Author hopes that it will be found useful to those who feel a scientific interest in the aliment of man. The article Digestion has been somewhat limited in physiological details, and those facts have chiefly been brought forward which have a practical bearing on dietetics.

In the arrangement of Drinks it was thought more useful and convenient to the reader, although not strictly agreeable to the general plan of the work, to describe a few of the more ordinary kinds along with water, as the basis of all diluents; those of an alimentary or alcoholic description being noticed as the products of the vegetables or animals from which they are procured.

The account of animals, birds and fishes, in regard to their chemical and dietetical properties, is not so full as could have been wished, from the deficiency of

facts and experiments recorded on these important subjects.

In the arrangement of the various alimentary substances, a system of classification was thought superior to one of an alphabetical kind. Lindley's Natural System of Botany has most frequently been followed in the vegetable kingdom, and the various plants of the same tribe have been arranged together, with some exceptions, where their dietetic affinities seemed to be remote. In the classification of quadrupeds, birds and fishes, that of Cuvier has been adopted, with the modifications of Bell and Yarrell.

The Author may add that he has seldom quoted the writers from whom he has derived his information, as this would have greatly incumbered his descriptions. He has, however, to acknowledge his obligations to the following works; namely, Prout on Digestion, &c., Beaumont on Digestion, Combe on Digestion, &c., Johnson and Martin on Tropical Climates, &c., Liebig's Animal Chemistry, Loudon's Arboretum et Fruticetum Britannicum, Burnet's Medical Botany,

Don's Dictionary of Gardening and Botany, Donovan's Domestic Economy, Matiere Medicale par Merat et De Lens, Traite de Chimie par J. J. Berzelius, Thomson's Organic Chemistry, Graham's Chemistry, Pereira's Materia Medica, Christison's Dispensatory and Treatise on Poisons, Henderson on Wines, Redding's History of Wines, Fleming's History of British Animals, Cuvier's Animal Kingdom, Bell on Quadrupeds, Yarrell's History of British Birds and Fishes, Naturalist's Library, Bushnan on Fishes, &c.

February, 1843.

A TREATISE ON DIET.

PART I.—DIETETICS.

DIGESTION—INDIGESTION—ALIMENTARY PRINCIPLES OF THE VARIOUS KINDS OF FOOD—DIET OF MAN DURING THE VARIOUS PERIODS OF LIFE—TIMES OF EATING—DIURNAL QUANTITY OF FOOD REQUIRED BY AN ADULT—DIET DURING DISEASES—DRINKS—CONDIMENTS—COOKERY.

CHAPTER I.

DIGESTION.

According to the most recent experiments, digestion is accomplished by the agency of a fluid secreted by the stomach, and named gastric juice. Besides saline substances, mucus, &c., it always contains muriatic acid, and a greyish viscid extractive principle, named pepsin, which is believed to be the digestive agent; as out of the stomach, with the aid of a little muriatic acid and heat, it dissolves coagulated albumen, boiled meat, &c. Lactic acid is also a very general constituent; but both Dr. Prout and Professor Liebig consider it a product of unhealthy action in the stomach. The change which the food undergoes in the stomach is called chymification; and this process is accomplished very slowly, being dependent upon the powers of this organ, the degree of mastication or previous reduction of the aliments, and their quantity.

According to the experiments of Dr. Beaumont, there are three indispensable requisites for the proper completion of chymification. First, an adequate supply of gastric juice, and its thorough admixture with every par-

ticle of food; second, a temperature of 98° or 100° Fahr.; third, a gentle and continued agitation of the alimentary mass, in the stomach. Liebig has shown that digestion is in proportion to the quantity of oxygen consumed during respiration. Exercise quickens the breathing, and hence its utility in promoting chymification; and as more oxygen is consumed during winter than summer, from the greater density of the atmosphere in the former period, there is generally a better appetite and a greater quantity of food thoroughly digested. In ordinary cases, the gastric juice is diffused through the whole semifluid contents of the stomach, and applied to the surface of each individual fragment of food. Liquid aliment is digested somewhat differently. The watery portion of it is very soon absorbed, thus leaving the semifluid parts to be converted into chyme. Milk and soups are exemplifications in which this process takes place; but the former is always more or less coagulated by the gastric juice. The chyme passes slowly from the stomach into the small intestine named the duodenum, and is there mixed with the bile and pancreatic fluid. By means of this mixture, probably assisted by the secretions from this part of the intestinal canal, the chyme is converted into chyle, a milky coloured fluid, considerably altered in its properties. The chyle is absorbed by the lacteals, where it is supposed to be vitalised, and conveyed by the thoracic duct into the veins; forming then a constituent part of the blood circulating through the system.

The comparative digestibility of different aliments, although a subject of great importance, has not hitherto been very accurately determined. The experiments of Dr. Beaumont, however, are more important than any previously performed. The case of St. Martin, who had an artificial opening in his stomach, furnished him with a very favourable opportunity of introducing aliments into

this organ and afterwards withdrawing them ; and making several other experiments connected with the process of chymification. At the same time, it may be remarked that the stomach of St. Martin could not be considered at the time in an absolutely healthy state, from the injury it had sustained; and although he exhibited no particular symptom of dyspepsia, the conclusions drawn by Dr. Beaumont must be viewed only in the light of approximative truths. Fifty-one conclusions are drawn from his experiments, the most important of which are the following:

1. Arrow-root and other purely farinaceous substances are readily converted into chyme; while soup and green vegetables, such as cabbage, turnip, carrot, &c. are very slow in their assimilation.

2. Minuteness of division and tenderness of fibre are essential for the ready digestion of flesh, fowl, and fish.

3. The quantity of food generally taken is more than the wants of the system require.

4. Bulk as well as nutriment is necessary to the articles of diet.

5. Oily food is difficult of digestion, though it contains a large proportion of the nutrient principle.

6. The time required for the digestion of food is various, depending upon its quantity and quality, &c.; but the period ordinarily required for the disposal of a moderate meal of the fibrous parts of meat with bread, &c., is from three to three and a half hours.

7. The gastric juice is capable of combining with a certain and fixed quantity of food; and when more aliment is presented for its action than it will dissolve, disturbance of the stomach or indigestion will ensue.

8. The motions of the stomach produce a constant churning of its contents, and admixture of food and gastric juice; from which is deduced the advantage of gentle exercise in promoting digestion.

CHAPTER II.

INDIGESTION.

As has been already noticed under Digestion, there is always muriatic acid present in the stomach during the process of chymification. In cases of indigestion, lactic acid, or the acid peculiar to milk, is also often formed in large quantities and sometimes with great rapidity. In confirmed cases of dyspepsia, the whole contents of the stomach sometimes become intensely acid in a short time, even in an hour after taking an ordinary quantity of food. Dr. Prout is of opinion that the acid is most frequently secreted from the blood; but may also be derived from the food. That the aliment in the stomach contributes materially towards the production of lactic acid, is rendered very probable, by the fact of its more abundant formation from some kinds of food than from others; even apparently under the same circumstances. Thus green vegetables are more liable to generate acid than farinaceous or animal substances. The digestive process seems to be accompanied with one very similar to the lactic fermentation; for much gaseous fluid is often evolved, and in general it will be found, that those alimentary substances which are most easily converted into lactic acid out of the body, by spontaneous decomposition or otherwise, are also the most ascescent in the stomach. In corroboration of this view, it may be stated as a result agreeable to the experience of those who have attended to this point, that when there is acid in a stomach, nearly empty, the next meal very speedily runs into the ascescent state. Liebig considers healthy digestion very much allied to fermentation or

putrefaction. If this be a correct theory, the analogy between indigestion and those two processes must be still more intimate. The advantages of emetics and bitters in the cure of some forms of dyspepsia may be thus partly accounted for. The first evacuate the acid ferment from the stomach, the second check, to a certain extent, the process of fermentation. Although lactic acid be thus generated abundantly from the food in cases of indigestion, there can be little doubt that it is also formed by the stomach; for when indigestible animal substances, such as bones, gristle, tendons, tough membrane, &c., are introduced into this organ, much acid is formed, even although little of the alimentary matters is dissolved. Besides these two sources of indigestion, it is highly probable that a third, although more rare variety is accompanied with a modification of the putrefactive process. Oily and several animal substances are apt, in some individuals, to produce unhealthy digestion, accompanied with eructations resembling the odour of putrid or spoiled meat; and both ancient and modern medical writers have attributed this to a putrefactive change in the alimentary substances. Dr. James Johnson remarks that "in these states of weak or impeded digestion, vegetable matter, wine, and even spirits, soon degenerate into a strong acid; while all oily substances become rancid, and animal matters putrid, producing sour and fetid eructations." The same author states that some instances have come under his notice, where the matters discharged from the stomach were extremely acrid and alkaline.

Dietetic Treatment of Indigestion. In regulating the diet during the treatment of indigestion, the following principles may be deduced from the facts and experiments already noticed.

1. Every alimentary substance, before it is swallowed, ought to be minutely divided, or carefully masticated.

2. It ought to be tender in texture, or rendered so by the processes of cookery.

3. It should be little liable to run into ascescency, or the lactic fermentation.

4. It ought to contain little oil or fat. Dr. Beaumont is of opinion that the saliva has no solvent effect upon the food, and that it is merely intended to facilitate mastication. He has rendered this opinion very probable; but whether it be true or not, the minute division and softening of the food by mastication is the most efficient method of effecting that end. Tenderness of texture is also a necessary quality of alimentary substances; for when tough or hard, they cannot be softened or thoroughly divided by mastication. And even when their minute division has previously been accomplished, the evil is only lessened not removed, for the central portions of the divided fragments are still hard and remain long unchymified.

Among animals, the muscular fibre or flesh of the young is the most tender, such as veal and lamb, and according to this law ought to be more quickly digested than beef or mutton. The contrary, however, is asserted by many respectable writers, but such has not been the result of my observation, when the cookery was simple and the quantity eaten moderate. It will often be found, upon careful inquiry, that when these articles of diet have been mentioned as the causes of indigestion, either too large a quantity has been taken, or too much gravy, fat, membrane, or gelatinous accompaniment has been swallowed along with it. And though animal substances are much less liable to generate lactic acid, in the stomach of a dyspeptic individual, than those of a vegetable kind, the gelatin of young animals frequently under such circumstances causes ascescency; and hence the muscular or fleshy parts should alone be used.

Fish is also condemned by some authors as liable to disagree with the dyspeptic. That this is the case with some of the oily fishes, such as the salmon, the family of herrings, the mackarel, and some others, there can be no doubt; but it is nearly as certain that many of the white fishes, namely, the whiting, haddock, cod, the common trout, &c. being tender but not gelatinous in the fibre, and containing little or no oily matter, are very readily digested. It is true that when taken with butter or other rich sauces, they often produce unpleasant feelings of indigestion; but it is by no means a legitimate conclusion to attribute this to the fish, when a well known indigestible article of diet is associated with it. When fish is taken by the dyspeptic, spices and salt, or a little ketchup, with or without mustard, are more suitable than oily condiments. In the vegetable kingdom the same rule with respect to texture will be found to hold, and it is well illustrated in the case of the potato. The raw or even the boiled *waxy* potato is digested with more difficulty than the *mealy* or farinaceous variety; chiefly because the latter is more easily broken down or disintegrated.

Cabbage, cauliflower, and other green vegetables are hard in texture when raw or half-boiled, but by protracted exposure to heat, they become pulpy and easily diffused among watery fluids; independent of all changes which may be produced in the fermentable principles they contain. This is a great objection to the employment of green vegetables by dyspeptics, particularly as cooked in this country; but their tendency to run into ascescency is a greater one; and the two united are so formidable, as to render these articles totally inadmissible as diet for such persons.

Milk, although an animal fluid, often disagrees with those who have weak digestive organs, from its liability to run into the lactic fermentation, particularly during hot weather,

when it is often slightly acid before it is used as food. For a similar reason, soups made with fermentable vegetables, fermented liquors in which the process of fermentation is not finished, or where there exists some of the saccharine fermentable principle, are injurious; but a small quantity of sound and dry wine, that is, wine free from acid and thoroughly fermented, may be taken with impunity, particularly if diluted with water.

Potatoes, although an agreeable and almost indispensable vegetable, are also liable to excite acidity and flatulency. Those of a farinaceous quality should alone be employed by the dyspeptic; and if the indigestion be extreme, are to be avoided altogether. Fruits of all kinds, acid, subacid, saccharine, and oily, are calculated to generate lactic acid and thereby derange the digestion; either directly by fermentation, or indirectly by becoming insoluble in the gastric juice, and thereby exciting its formation by the stomach. Of all the vegetable aliments the purely farinaceous and amylaceous, or starchy kinds, are the best adapted for the digestive organs of the dyspeptic; being rapidly chymified, having little tendency to produce acidity, and from their loose state of cohesion, being readily mixed with the gastric juice.

Bread, rice, the pea, sago, arrow-root, tapioca, and Irish moss, are familiar examples of this kind of alimentary matter.

In extreme cases of dyspepsia, even these, light and digestible as they are in general, sometimes occasion disagreeable feelings, which are often owing to the methods of cookery employed, particularly to the large addition of milk, sugar, or eggs. In such cases the article should be boiled with water, containing a little common salt or sugar. It is much lighter when thus prepared, and may be used with *sound* milk or diluted sherry. In a few

instances I have recommended, with advantage, weak brandy toddy. The finest quality of pease meal is well adapted for dyspeptics, and as it is agreeable and more nutritive than the purely starchy aliments, may in many cases constitute a part of their diet. It ought to be prepared with a large quantity of boiling water, so that it may be thoroughly cooked, and have a thin consistency. Some of the farinaceous grains, from the large quantity of saccharine matter they contain, are liable to produce acidity. This is particularly the case with the oat, which is frequently employed in the preparation of a very agreeable gruel. Were it not for this objection, this grain is well adapted for the dyspeptic, as it is less constipating in its effects than several of the other species. Oatmeal may, to a considerable extent, be deprived of this injurious quality by maceration for a few hours in cold water, accompanied with occasional stirring. The preparation named *sowens* in Scotland, and *flummery* in some other parts of this country, is very similar to the article which would result from a prolonged maceration of oatmeal in water; and when well freed from the lactic acid which is generated, greatly resembles, in its properties, arrow-root, sago, and other amylaceous products. Sound and well fermented wheaten bread, if stale and slightly toasted, in general agrees well with those who have weak digestive organs; and is commonly their staple article of diet. But new bread is apt to excite acidity, and sometimes a feeling of weight in the region of the stomach. This arises in a great measure from the peculiar cohesion in the structure of new bread; but, in some cases also, may be produced by a revival of fermentation in the stomach, particularly when this process has not been completely extinguished by the heat of the oven. Stale bread possesses a certain degree of elasticity, and is easily broken down into fragments and disintegrated amongst

water; whereas new bread does not acquire these properties thoroughly for twenty-four hours, and when masticated assumes to a certain extent the consistency of dough.

Under the primary deductions, fat or oily substances were enumerated as very indigestible. It has been the opinion of some authors, and is still believed by a small portion of the public, that the fat of quadrupeds is light and easily digested. This is contrary to the experiments of Dr. Beaumont, who found that pork, fat and lean, and suet with beef, required between five and six hours for chymification; and few decided dyspeptics who have once dined heartily on fat pork or beef, will have any particular desire to repeat the experiment.

Dr. A. Combe, however, states that he has known very fat fried bacon digested with ease at breakfast; where even a small potato would have disordered the stomach. Besides this, there are other facts connected with the history of bacon, which illustrate its easy digestibility, in particular cases. A certain species of highly spiced bacon ham is said to have cured many persons of dyspepsia, when cut into very thin slices, fried, and taken to breakfast. Although it may readily be admitted that there are some individuals, with weak digestive organs, who can assimilate fat pork or bacon without much inconvenience; yet a more satisfactory explanation of the majority of the cases alluded to, may be given, upon the facts, that a small portion only of the article is swallowed; that it is highly spiced; that a stimulating empyreumatic oil is generated during the cookery, and that the latter, in conjunction with the spiceries, occasions the flow of a greater quantity of gastric juice.

I have thus entered pretty fully into details respecting the dietetic treatment of dyspepsia; but perhaps it may be useful to sum these up, by an example of the diurnal

quantity of food that should be used, and the mode of its distribution into meals; for the test of satiety after slow eating, inculcated by many authors, is not to be relied on. It is by no means my intention to assert that the following is the best of all scales of diet for the decided dyspeptic; for many extreme cases occur, where nothing stronger than farinaceous or amylaceous substances can be digested, and there are others where the quantities here enumerated would be too small; but it is merely intended as a general or medium rule for those who have no precise guide for their appetites.

Breakfast may consist of eight or ten ounces of moderately strong tea or coffee, sweetened with a little refined sugar, and four or five ounces of bread slightly toasted. Dinner, in four or five hours afterwards, according to the exercise taken, may be composed of six or eight ounces of boiled fish, with three or four ounces of bread; or four ounces of broiled mutton or beef, tender, and thoroughly cooked, may be substituted for the fish; or what will often be found more digestible, a slice of cold roast-beef. A glass of sherry diluted with six or eight ounces of water, or a dessert-spoonful of brandy, similarly diluted, may be used as drink; but more frequently pure water will be found the best of all diluents. Tea or coffee may be taken between three and four hours after dinner, for which there will be some appetite, if exercise has been employed in the interval; and it may consist of six or eight ounces of liquid, and three or four of bread. In this case no supper should be taken, but if it be preferred to tea; arrow-root, sago, or potato flour may be used, or toasted bread with a little weak negus or brandy toddy.

A summary of the whole treatment of indigestion may be included in the following points; namely, attention to the quantity and quality of the diet and drink; regularity of

bowels, the regular employment of cold or tepid sponging, or bathing, accompanied with a residence in a healthy situation, where the air is uncontaminated, and where exercise proportioned to the vigour of the body may be employed. The medicinal portion of the treatment, although often highly useful in promoting the cure, and in relieving many immediate or remote painful sensations, may be characterised as only adjuvant or accessory; being quite inefficient without strict attention to regimen and dietetic rules.

CHAPTER III.

ALIMENTARY PRINCIPLES OF THE VARIOUS KINDS OF FOOD.

ALIMENTS are derived either from the animal or vegetable kingdom. According to Professor Liebig, they consist, first, of nitrogenated substances, which contain nitrogen; and secondly, of non-nitrogenated substances, which do not contain this elementary body. The former, or those which contain nitrogen, are convertible into blood, and go to the formation of muscle and other organised tissues; the latter, or those which contain no nitrogen, to support the process of respiration. The nitrogenated aliments are vegetable fibrin, v. albumen, and v. casein, animal flesh, and animal blood. The non-nitrogenated aliments are fat or oil, starch, gum, sugar, pectin (vegetable jelly), gum, bassorine, wine, beer, and spirits. This author has found, that the nitrogenated constituents of vegetable food have a composition identical with that of the constituents of the blood. Hence he concludes that no nitrogenated compound, the composition of which differs from that of fibrin, albumen,

and casein, is capable of supporting the vital processes in animals. Gelatin, a nitrogenated animal body, differs in composition from fibrin, albumen, and casein, the three primary nutritive principles of animal and vegetable substances; and on this account it is considered very unimportant as a nutritive agent. This theory is very ingenious and probably correct; and enables us to explain satisfactorily the well known fact, that animal flesh, fish, bread, &c., support the strength and vital processes much better, in similar proportions, than rice, arrow-root, sugar, &c. It must be allowed, however, that though there appears to be an intimate connection between the composition of the food and that of the organised tissues, which are nourished by it, yet, that this alone will not, in every case, account for the superiority of one kind of aliment to another. Thus the flesh of animals has a similar composition to that of fishes; yet the first is generally admitted to be greatly superior in nutritive power to the second. No precise experiments, so far as I am aware, have been made to determine this point; but from the general experience of mankind, it may be deduced, that a diet of fish and vegetables is not capable of raising the system to the same strength and energy as a similar proportion of animal flesh and vegetable substances; while a purely vegetable diet, even of nitrogenated aliments, is inferior to both. Although this view appears to be correct, there is some difficulty in explaining it, but it may perhaps depend upon the arrangement of the particles in the flesh of quadrupeds being more like that in human structures, than in fishes and nitrogenated vegetables. According to Liebig, the non-nitrogenated substances, although not directly nutritive to the muscles and other similar organs, yet serve a very important purpose in supporting the functions of the animal economy. The process of respiration, in some respects, re-

sembles combustion in a furnace; for thirteen or fourteen ounces of carbon are frequently consumed in the lungs, by an adult, every twenty-four hours; and animal heat is thus supposed to be generated. This carbon is supplied from our food, and it does not appear necessary that the latter should be nitrogenated, in as far as the process of respiration is concerned. This fact, amply corroborated by dietetic experience, shows that the larger proportion of our food may consist, with perfect safety, and most likely with advantage, of substances that contain no nitrogen. When the carbonaceous food is taken to a greater amount than is required to support respiration, &c., its constituents are deposited in the cellular texture in the form of fat; being in many cases a storehouse of combustible materials for any extraordinary demands of the animal system. Thus during fevers, and other acute diseases, accompanied with increased respiration, and where very little food is taken, the fat of the body disappears very rapidly, and, as it contains a large proportion of carbon, it is well fitted to support the process of respiration. Again, it is known from experience, that oily and farinaceous substances, beer, wines, &c., which are rich in carbonaceous principles, tend to produce obesity in man, and to fatten the lower animals; while the milk of the mammiferous class, when fed with this aliment, furnishes a large proportion of butter. If active exercise be combined with this diet, the superfluous portion is consumed by the lungs, skin, &c.; for the carbonic acid given out by these two organs is then greatly increased. Hence, the fattening of the lower animals is most successfully conducted in confinement; as is usually practised with oxen. When the goose is fattened as a delicacy for the epicure, it is placed in a coop with its legs tied; and then its liver becomes double or treble the natural size, from the deposition of fat in its cells. M.

Boussingault, and several other French philosophers, seem to consider substances destitute of nitrogen as of little value in supporting the animal economy. This opinion is not agreeable to theory, and is opposed by experience; for though it may be granted that the food of man must contain a certain proportion of nitrogen, yet the amount of carbon and nitrogen together ought to be considered the measure of the alimentary properties of different substances; as both of these elements are absolutely necessary for the support of important vital functions. It has been already mentioned that Liebig considers gelatin as a very unimportant agent in the process of nutrition, and he does not stand alone in holding this opinion. Its nutritive properties have of late years occasioned much discussion among French chemists, particularly regarding the gelatin extracted from bones. Ten years ago a commission was appointed by the Institute of France, to inquire into this subject; but hitherto their conclusions have only tended to prove that gelatin exhibited *alone* is incapable of nourishing animals for any length of time. They have not, however, determined its alimentary power, when mixed with other kinds of food. The observations of M. D'Arcet, have answered this to a certain extent. He shows that in various hospitals in France, Holland, and Russia, the health of the inmates has been improved by using soup made from the gelatin and fat of bones, along with other alimentary substances. Indeed, the old experiments of Dr. Stark, the modern researches of M. Majendie, and the results above mentioned, all tend to prove, that alimentary principles exhibited *alone*, such as gelatin, albumen, sugar, and oil, with the exception of the gluten of wheat-flour, are not capable of nourishing animals for any length of time. Dr. Prout very justly considers milk, which is a natural product, as the prototype or model of an alimentary compound; as every kind of milk contains

sugar, oil, and albumen. The food generally employed in Great Britain, and in several other countries, has more or less resemblance to this in its composition, as it consists of farinaceous substances, sugar, butter, vegetables, animal flesh, fish, &c. It may therefore be inferred with probability, that this kind of aliment is most conducive to health and vigour of body; but it is also well known that considerable deviations from it may be practised with impunity.

CHAPTER IV.

DIET OF MAN DURING THE VARIOUS PERIODS OF LIFE.

It may be assumed as a truth, rarely disputed at the present day, that man is an omniverous animal. He, no doubt, can live on either animals or vegetables, exclusively; but his vigour, activity, and freedom from disease, are best promoted by their combination in certain proportions. When animal food is exclusively employed, it overstimulates the system, and increases for a certain time the general vigour and muscular power. But if little or no exercise be taken, a plethoric and sometimes a putrescent state is induced, more particularly if meat long salted has been used. Vegetables, on the other hand, are, in general, more difficult of digestion and less stimulant, as well as less nutritive in proportion to their bulk; hence a diet of this kind is not calculated to raise the system to much corporeal strength or energy. The nations who live almost entirely on vegetable aliments, rarely exhibit the same muscularity or vigour of body, as those who employ a proper proportion of animal food; and those who have most distinguished themselves by their feats in war, have generally been, to a greater or less extent, a carniverous race. A proportionate combination of these two

kinds of aliment is therefore necessary, on the one hand, to raise the physical, and, perhaps, to a certain extent, the intellectual energy of man to its proper status; on the other, to prevent a dangerous fulness of the system, and an improper exercise of the passions or feelings. The inhabitants of warm climates, as a general rule, require less animal food than those who inhabit northern countries. This may be accounted for on the principle, that animal food generates, during its assimilation, a greater quantity of heat than that of a vegetable kind. In the first case, it would prove too stimulating to the inhabitants, when accompanied with the excessive heat of the climate, and would predispose them to diseases of an acute character; while, in the second, were they to live chiefly on vegetables, the intensity of the cold would weaken or overpower them. But the Creator has wisely provided for these contingencies; for, in tropical countries, vegetables of every variety are abundant; while, in northern regions, animals or fishes are the principal species of aliments that can be procured.

Diet during Infancy. The young of mammiferous animals are provided, by nature, with food, which the Almighty clearly intended should supersede all other kinds for a certain time; and nothing is better established, both by theory and multiplied experience, than the superiority of the mother's milk over every kind of artificial diet, however carefully and skilfully it may be managed. It is well known, however, that nurses by no means unfrequently deviate from this palpable law, and some do not hesitate to exhibit panado or arrow-root before the infant is a day old. It is true, that mothers and nurses can bring forward instances of infants, who have been reared solely by spoon diet, and yet have maintained health and vigour of body; but they totally forget, in their calculations, the immense disproportion which

these bear to those whose constitutions have been weakened, or who have died from the effects of such treatment. The injurious effects of artificial aliment to infants, at least for the first three or four months, are much more perceptible in large and crowded cities, than in the country; for, in the former, their digestive organs are weak, and frequently incapable of assimilating solid food without indigestion; whereas, in the latter, deviations from natural laws may be more frequently practised with impunity. Those derangements of the stomach and bowels, induced by improper aliments, may not, in all cases, prove directly fatal to the little patients; but, by weakening and breaking down the system, they fearfully increase the mortality among them, by our various epidemic and contagious diseases. Dr. A. Combe makes the following strong, but we fear, accurate remarks upon this subject: "Those whose opportunities of observation have been extensive, will agree with me in opinion, that nearly one-half of the deaths occurring during the first two years of existence, are ascribable to mismanagement, and to errors in diet." No other food, therefore, but the milk of the mother, should be given to the infant for the first four or five months, and this period must sometimes be prolonged, when it is delicate in constitution. Small quantities of panado, arrow-root, &c., may then be given, and gradually increased until the infant is capable of being weaned, when ten or twelve months old. This period may often be protracted a month or two longer with advantage to a delicate child, if the mother be healthy.

The quality of the milk is another important circumstance connected with nursing, and this is too little attended to, by the generality of mothers. It is a well established fact that the quality of the milk is much influenced by diet, drinks, state of the digestive organs, exhibition of medicines, passions of the mind, &c.; all

of which should be calculated, as they tend to influence the health of the child. Nurses who are troubled with indigestion, accompanied with acidity, flatulence, &c., are very apt to furnish milk which produces similar effects on the child. This is frequently induced by an indulgence in the use of fermented liquors, rich gruels, &c., which are taken for the purpose of increasing its quantity, the quality being, in the estimation of many nurses, a secondary consideration, or one which is not tangible to their apprehension. A healthy female who uses an ordinary quantity of food and drink, according to the dictates of nature, is always able to furnish a sufficient supply of milk for one infant; and I have sometimes remarked that a superabundant quantity was apt to produce indigestion, apparently from no other cause than an overcharging of the stomach. For further particulars respecting this subject, the reader is referred to the article *Milk*.

DIET DURING CHILDHOOD AND YOUTH. After weaning, the milk and farinaceous diet may still be continued for several months; the proportion of the latter being increased according to the age of the child. A small quantity of beef-tea and bread may then be given for dinner, to which may be added, in a few months more, a portion of egg, soft boiled. When the child is between two and three years of age, a little tender animal food may be allowed, which is to be gradually increased according to the exercise which is taken, from one to four or five ounces, until the age of ten or twelve. Fish, such as haddock, whiting, or other members of the cod family, is an excellent kind of aliment for children; and it would conduce to their health, and the welfare of their digestive organs, if this were occasionally substituted for meat. During the period of active adolescence, when the growth is rapid, and the exercise considerable, the quantity of food may safely be increased;

as the digestion is generally very rapid. The proportion of animal to vegetable food may also be greater, in order that a proper quantity of blood may be formed for the nourishment of the various organs. An active healthy boy of fourteen or fifteen years of age, will thus require as much food as a man; for supply is necessary, not only for the tear and wear of the system, but also for the increase of his muscles, and other important organs of his body. This activity of the digestive organs continues generally during the whole period of youth, and must therefore be rationally supplied. But the capabilities of the stomach are too often put to the test; and though this organ may be able to digest almost every kind of aliment, and though feats of voracity are often accomplished with impunity, the youth should be guarded against inordinate repletion. Chronic indigestion is rarely the result of thus overloading the stomach; but diarrhœa, vomiting, and febrile attacks are frequent consequences of the practice. Besides these directly injurious consequences, a habit of over-eating is created, which in after life may permanently derange the functions of the stomach.

Diet during Manhood. After the full growth has been attained, there is no necessity for an extra supply of food; as the production of new blood is only required to supply the regular expenditure of the body, and not to increase its size. On this account digestion, generally, becomes less vigorous, and functional derangement of the stomach is liable to occur, if the previous habits of indulgence be continued. During the vigour of manhood, the functions of assimilation are subject to little change, and require little or no modification of the ordinary diet, when the balance of the system continues natural. But about the age of fifty, retrograde symptoms often make their appearance, in the functions of many important organs, accompanied with a tendency to organic diseases,

and the stomach is no exception to the law. Caution is therefore necessary at this period of life, in taxing the capabilities of the stomach too much; and the majority of observing men curtail their enjoyments at the table, while the bon-vivant is often seen lingering at his post after the die has been irretrievably cast. Corpulency and fulness of the blood-vessels are then apt to occur from high living, and the two, when united in the same persons, often place them in a perilous situation.

It is difficult, however, to convince those who have long been accustomed to a luxurious life, that there is now a necessity for some change in their mode of living; and that their animal food, wine, spirits, &c., must all be curtailed, if they wish to protract their existence to that natural period when mortality is inevitable.

CHAPTER V.

TIMES OF EATING.

Regularity in taking food is generally, and very justly, considered an important rule for preserving the vigour of the digestive organs. The labour of digestion is thus properly divided, or rendered more equal; and the stomach is not required to perform an extra quantity of work, as sometimes happens after long fasting. There are, no doubt, many individuals who can ply their stomachs with food at any hour, without apparent injurious consequences; but this habit is very hurtful to those who have weak digestive organs, and generally to persons of sedentary occupations. Both reason and experience show, that the chymification of the food in the stomach ought to be finished, or nearly so, before a new quantity is taken

to supply its place. But if this rule be neglected, and another portion equally large be swallowed before this process is completed, the stomach becomes overloaded, and is unable to furnish a sufficient quantity of gastric juice for its conversion into chyme. Hence the generation of lactic acid in excess and flatulency, accompanied with the other symptoms of indigestion. On this ground, the habitual use of luncheons is objectionable, except in cases where the previous repast has been merely nominal. Many persons, for example, eat very little at breakfast, and what is taken then is consequently very soon digested; they may, therefore, take with perfect safety a luncheon at noon, provided their dinner be late. The same principle may be carried out with respect to other meals, due regard being always given to what precedes and what is to follow. Almost all civilised nations have adopted general rules for their times of eating, which are various in different countries; and even in the same country, the inhabitants of certain districts have acquired peculiar habits of this kind. In general, however, three meals have been considered necessary to support the tear and wear of the system during ordinary labour or exercise. Breakfast, or the morning repast, is the first, and as the stomach is presumed to be empty at this period, and to have recovered its tone, it ought to be substantial; so in general it is found, that both appetite and good digestion are its accompaniments, when regularity of life and due exercise are attended to. Much or fatiguing exercise before breakfast is, however, frequently injurious, particularly to delicate individuals, in whom it is liable to produce exhaustion, and subsequently a slow or imperfect digestion. In ordinary cases, the exercise of bathing or sponging the body with cold or tepid water, and dressing, followed by a short walk in the open air, are quite sufficient to prepare the stomach for the digestive

process. If breakfast has been substantial, five or six hours, in general, should elapse as an interval before dinner is taken; and if ordinary exercise has been employed during that period, the stomach will be sufficiently prepared for its reception. Late dinners are common among some classes of society, and eight or nine hours may be considered the ordinary interval between breakfast and dinner in most of these cases. This interval is too great; for the stomach is thus unemployed for some time, and consequently is apt to be overloaded at a period when the system has been exhausted by exertions during the day. This practice is attended with another evil, namely, a disinclination to exercise after dinner, and an inducement to relieve the languor of the body by excess of stimulants.

When a person is so situated that he requires to adopt the fashion of late dining, he ought to take a luncheon, about five hours after breakfast; and this, under ordinary circumstances, should be considered as a proportion of his dinner. Tea or coffee is generally taken in the evening, in this as well as in many other countries; and some individuals use these merely as diluents, while others convert them into one of their ordinary repasts. The quantity of food which ought to be taken as an accompaniment to tea or coffee, must obviously depend upon the previous dinner, the interval which has elapsed, and the exercise taken. If the dinner has been late, or about six o'clock, tea should only be used as a diluent; but if an individual dines about three o'clock according to the natural law, and uses moderate exercise in the interval, he is quite competent to digest a moderate quantity of aliment in four hours afterwards.

The following excellent observations of Dr. A. Combe give a comprehensive outline of the principles laid down in this section, for the guidance of those who live in artificial society :

"At whatever hour the meal was taken, the real wants of the system were supplied when they manifested themselves in the form of appetite, and the requisite intervals were observed. If a substantial breakfast was taken at eight o'clock, then a corresponding interval elapsed, before another meal followed at one or two. If, again, the morning allowance was trifling, then the real breakfast followed at an interval correspondingly short, namely, at eleven o'clock. So also with dinner. And if dinner was at one o'clock, tea followed at the distance of six or seven hours; whereas if it came at six or seven o'clock, a refreshment preceded and nothing followed it, and the result was comfort and sound digestion."

EXERCISE BEFORE AND AFTER EATING. Much exercise either of body or mind immediately before eating is considered, by several of the best writers on dietetics, as injurious to the process of digestion; and undoubtedly when fatigue has been induced, both the powers of the stomach and the comfort of the individual will be promoted by a short rest, particularly in the recumbent posture. In the ordinary occupations of men, however, no particular rule is necessary, when the digestive organs are healthy; as is exemplified in the peasants, labourers, and artisans of this country. Such examples also warrant the inference, that ordinary labour or exercise in half an hour or an hour after eating does not interfere materially, if at all, with the process of digestion; and when moderate, it very probably promotes that peculiar churning motion of the stomach which Dr. Beaumont has shown to be necessary for chymification. On the other hand, violent exercise, such as quick walking, running, &c. occasion too much agitation of the stomach, accompanied with a quickened circulation of the blood, and hence are liable to produce fermentation of the food, flatulence, and deranged action of the heart. Similar results

occur with many of our domesticated animals; and are well known to grooms and trainers of horses and dogs. Many authors recommend complete rest of body and mind, to those who have weak digestive organs, for an hour or two after eating; and most persons labouring under this affection, feel much disposed thus to indulge the languor and depression which are generally its accompaniments. I have generally found that complete inaction in such cases tended rather to aggravate than relieve the disagreeable symptoms; such as reclining on a sofa; but particularly sleeping, either in the recumbent or any other position, which in addition is liable to excite headache.

A short and slow walk or saunter in a garden or lawn, about half an hour or an hour after eating, will often be found useful in promoting digestion and in relieving languor. If the weather does not permit of this, a similar exercise may be had recourse to in the house; to which may be added light and cheerful conversation.

CHAPTER VI.

DIURNAL QUANTITY OF FOOD REQUIRED BY AN ADULT.

Writers on dietetics, and those who legislate on diet, differ widely in their estimates of the daily amount of food necessary for the due nourishment and support of the body. No conclusion can therefore be drawn from the theoretical doctrines of any particular writer or other authority, on this important and difficult subject. An accurate series of facts and experiments is still required to elucidate this matter thoroughly; and though an

attempt is here made to deduce a general rule from the diet tables of large establishments, the question must still be viewed as, to a certain extent, problematical. This is frequently mistaken by the public, who confound the amount of food that will simply keep human beings in existence, with the amount that will promote their greatest health, vigour, and longevity. Cornaro is frequently quoted as an example of a person attaining a great age, namely, a hundred years, upon an extremely small quantity of food. His diet consisted of twelve ounces of solids and thirteen ounces of drink daily; but his friends advised him, when eighty years old, to make a little addition to his food, which was raised to fourteen ounces, and his drink to sixteen ounces. This increase, according to his own account, caused pain, uneasiness, dejection of mind, and a fever which lasted for thirty-five days, from which he, however, recovered, and then resumed his old diet. The following was his state of body in his eighty-third year. "I can mount my horse without assistance, I climb steep hills, and I have lately written a play abounding in innocent wit and humour," &c. This is certainly a strong case in proof of the attainment of longevity by the use of a very abstemious diet, united with comparative ease and affluence; but it must be taken as an extreme one, or perhaps rather as an exception. In luxurious countries, it is probable that more people die from the ultimate effects of repletion, than from the opposite extreme; yet in some of the public institutions of Great Britain, a diet greatly exceeding that of Cornaro has been found too small. His case ought to be considered as one of morbid sensibility in the digestive organs, which prevented him from taking with comfort more than twelve ounces of solid food daily; a quantity which might be employed by other individuals to more than twice the amount, without any disagreeable

effects, and without any undue increase of their physical weight. In estimating the quantity of food necessary for a full-grown man, having healthy digestive organs, there are two points involved in this consideration which require to be adverted to, namely, the physical weight of the individual and the amount of his exercise. It appears to be an almost self-evident truth, that a man of small physical weight, cannot, under similar circumstances, require so much food to support the tear and wear of the system, as one nearly double his weight and capacity. Yet we often find persons, who are little better than the shadows of other men, matches for them in the department of eating; and discrepancies of this kind are so frequently met, as almost to warrant the ordinary belief, that the size or weight of the body seldom regulates the capacity of the stomach for food. Yet to a certain extent this ought to exist among healthy individuals, placed in similar circumstances. It has been explained in a former chapter, that aliments are destined to support the system, first by supplying carbon to the lungs, skin, &c., and second, by the formation of blood; now if one man have larger lungs, greater extent of skin, and more muscle than another man, he of the greater capacity must consume more carbon and nitrogen in the support of these functions; and hence, will require more food containing these elements. Greatly, however, as some men differ from others, in natural size, this is as frequently owing to the accumulation of fat; and a man may thus nearly double his weight, without increasing the capacity of his lungs, the size of his muscles, or the number of his cutaneous pores. Men who have thus increased their weight by corpulency do not, for this reason, require the same amount of food, as those of similar size who are favoured with no such covering; and it is probable that the fat, when once formed, is allowed to

remain partially dormant; and hence its actual weight is supported by less food than was required for its formation. The foregoing view, although apparently correct in theory, cannot be frequently applied in practice to man, living, as he does, in artificial society, and often inheriting morbid peculiarities from his progenitors. Defective assimilation is perhaps the most frequent of these, and though many spare individuals make no complaint respecting their digestive organs, this very state of body, in the absence of other probable causes, is sufficient proof of imperfect digestion. In such instances, it is highly probable that from imperfect assimilation more than the usual quantity of food is required to furnish the necessary supplies to the system; or to raise it to a medium standard of weight.

The next point of consideration is exercise, an influence which is very powerful, and one that has more effect in promoting digestion than any other external cause. It is well known, that men who have great physical exertion, require more food than those who are engaged in sedentary occupations, and this practical rule admits of easy explanation. Laborious exertion quickens the respiration, the circulation of the blood, the perspiration, or action of the skin, and promotes the other secreting and excreting processes of the system; in consequence of which, a greater quantity of carbon and nitrogen are consumed, than would occur under different circumstances; and hence a larger supply of food is required to counterbalance this evacuation. It has also been generally found, that those engaged in hard labour in the country, use more food than those laboriously employed in a city; and the former, no doubt, require a larger supply; for the air being more pure, as well as more condensed, more oxygen will be inhaled, and consequently will cause a greater consumption of carbon during respiration.

It thus appears, that the quantity of food necessary for the proper nutriment of the system, depends to a considerable extent upon the amount of exercise, the state of the digestive organs, and the physical weight of the individuals; but that a practical rule for particular classes of men, can only include the first in the calculations; while in individual cases, the plan must be varied according to the results of experience and observation.

The diet of every person on board her Majesty's ships consists of the following daily allowance: Bread, 1 pound; cocoa, 1 ounce; sugar, $1\frac{1}{2}$ ounces; fresh meat, 1 pound; vegetables, $\frac{1}{2}$ pound; tea, $\frac{1}{4}$ ounce. When fresh meat and vegetables are not issued, each man receives instead of them $\frac{3}{4}$ pound of salt beef, and $\frac{3}{4}$ pound of flour, alternately with the same quantities of salt pork and split peas. Sailors are also allowed weekly a certain quantity of oatmeal and vinegar, besides wine or spirits daily.* In estimating the weight of this allowance, the salt meat will be taken in place of the fresh meat and vegetables; as the latter vary in the proportions of water which they contain. The whole, therefore, amount to $42\frac{1}{2}$ ounces, besides the weekly allowance of oatmeal and the nutriment contained in the wine or spirits. This amount may be considered the maximum, both in point of quantity and in the proportion of animal to vegetable substances; for the labour of the sailor is often very arduous, and the strength, courage, and determination of British seamen are well known to be of the highest kind. The Irish peasantry are also a hardy and vigorous race of men, and are capable of very laborious exertion. They live, notwithstanding, chiefly on potatoes, with the addition of very little animal food, and sometimes, though perhaps rarely, without any product, either from animals or fishes.

* Medical Gazette, August, 14th, 1840.

The Poor-Law Commissioners found, that the greater number of the Irish peasantry consume nine pounds of potatoes at their two daily meals. The nutritive properties of potatoes have been estimated variously by different authors. Parmentier calculates 5 pounds of potatoes equal to 1 pound of wheaten bread; Vauquelin and Percy consider $2\frac{1}{2}$ pounds of potatoes equal to 1 pound of bread; Boussingault, upon his estimate of the amount of nitrogen in different vegetables, states that 191 of wheat are equal to 1096 of potatoes.* In the first of these opinions, the nutritive power of the potato is underrated; in the second it is somewhat exaggerated; and the third, although not so far from the truth as the others, if we allow for the water which wheat-flour absorbs during its conversion into bread, is not to be depended on, as the grounds upon which it is founded are still problematical. Potatoes contain 75 per cent of water, the remaining 25 parts consist almost entirely of nutritive matter; 4 pounds of potatoes may then be estimated as nearly equivalent to 1 pound of flour, or to rather more than $1\frac{1}{4}$ pounds of bread; therefore, 9 pounds of potatoes are equal to about 45 ounces of bread. But allowing for some difference of opinion as to the amount of nutritive matter in this root, it may safely be asserted, that the Irish peasant who consumes 9 pounds of potatoes daily, receives aliment at least equal to 40 ounces of bread.

When men have little exercise, or are sedentary in their occupations, a smaller amount of food is sufficient to support the system. British troops are victualled during their voyage to the East Indies on the following diet: $23\frac{1}{2}$ ounces dry vegetable matter; 8 ounces animal food; which amount to $31\frac{1}{2}$ ounces.† The following diet was

* Brit. and For. Medical Review, April, 1842.

† Carpenter's Human Physiology.

used by Dr. Dalton, when comparatively young, during some experiments which were undertaken for the purpose of ascertaining the quantity of the different secretions, as compared with the quantity of food. It is highly probable, that the allowance of this eminent chemist did not exceed the calls of nature, and it may be adduced as an exemplification of the amount of food required by a person having ordinary exercise.

His consumption of solids was, bread 12 ounces, oatcake and oatmeal 7 ounces, butcher's meat 4 ounces, potatoes 9 ounces, pastry 4 ounces, cheese 2 ounces; but if the nutritive powers of the potatoes be calculated into that of bread, they will amount to nearly 3; the whole will therefore be 32 ounces. In addition to the solid food, he used 53 ounces of alimentary liquids, namely, milk, beer, and tea.* The Millbank Penitentiary furnishes an example of the sufficiency of one scale of diet, and the deficiency of another, for those engaged in ordinary labour and under confinement. "The allowance to the prisoners had formerly been from 31 to 33 ounces of dry nutriment, daily, and the prison was considered healthy; but in 1822, it was reduced to 21 ounces. The health of the prisoners continued unbroken for nearly six months; but scurvy then showed itself unequivocally." The disease chiefly attacked those who had been imprisoned for a considerable time; while those employed in the kitchen, and who had 8 ounces of additional bread, were nearly all exempted from the disease.† Another scale of diet is applicable to those who are constantly under confinement, either voluntarily or otherwise, with little or no exercise; and to persons of sedentary occupations, where little or no muscular exertion is required. In these, the functions

* Lancet, March 31st, 1838, and Glasgow Medical Journal.

† Carpenter's Human Physiology.

of respiration, the skin, stomach, and many others, move languidly on; less carbon and nitrogen being necessary to promote these processes, there is therefore a smaller supply of food required. It has been found difficult, in many public institutions, to ascertain the most appropriate quantity of food, so as, on the one hand, to economise the expenditure, and, on the other, to avoid the greater evil of a deficient allowance. The Poor-Law Commissioners state, that confined criminals and paupers are healthiest when the daily solids are not much either above or below 24 ounces. A convict ship conveyed to New Holland, in 1802, 433 prisoners, who were all kept in good health on 16 ounces of vegetable and 7½ animal food per day.* The full diet of the Glasgow Infirmary, for 1840, consisted of oatmeal or peasemeal 8 ounces, meat 8 ounces, bread 8 ounces, or potatoes 16 ounces, equal to 24 ounces of solids; sweet milk 16 ounces, broth 16 ounces. These scales of diet do not differ materially in quantities, and may be reckoned a fair allowance for a person confined and without exercise; its sufficiency may nevertheless be doubted, if entirely composed of vegetable substances, and continued for a lengthened period.

The following inferences may be drawn from the foregoing facts and statements; but which, it must be admitted, are capable of great modification, according to circumstances.

1. Persons engaged in laborious occupations, can be supported on 40 ounces of solid food daily; two or three ounces additional may in a number of cases be advantageous, and this quantity will support the stamina of life more effectually, if it contain a fourth or fifth part of animal flesh or other animal preparation.

2. Those employed in ordinary labour, or who have

* Carpenter's Human Physiology.

ordinary exercise, require about 32 ounces of solid food, of which a fourth or fifth part may consist of animal substances.

3. Those who are constantly confined to the house, without exercise, can be supported on 24 ounces of solid food, containing a fourth or fifth of animal flesh or the same proportion of other animal product.

CHAPTER VII.

DIET DURING DISEASES.

It would be quite impossible, within the limits of an ordinary chapter, to describe the specialities of diet as applicable to each particular disease; but this does not appear essential, as many of them may be treated under classes, and as indigestion, which is a complication of many chronic diseases, and in most of these forms the primary indication in the selection of diet, has elsewhere been very fully noticed.

1. Febrile and Inflammatory Diseases. In these prevailing affections, the functions of the digestive organs are greatly enfeebled, and the ordinary solid alimentary matters, such as meat, potatoes, butter, &c., are very imperfectly digested, and frequently remain for a long period in the stomach, little changed. It is therefore essential that such substances be avoided; for their presence in the system will increase the heat of the body, and quicken the breathing. Farinaceous and amylaceous or starchy aliments, which are readily digested and produce little increase of heat during their assimilation, have been found the best adapted for these affections; to which, in certain cases complicated with debility, or in weak individuals beef-tea, deprived of fatty matter, may be added.

Acid alimentary drinks, made from various fruits are frequently exhibited, as they are very agreeable and refreshing; but it is a safe practice to allow them in a very diluted state, as they are apt to run into fermentation, causing irritation in the bowels, and sometimes diarrhœa. Tea or coffee is adapted for the whole of this class; only, however, at the regular hours of diet. Pure water, soda water, water very slightly acidulated with any of the mineral acids, or with pure tartaric or citric acid, constitute the best drinks for patients labouring under these affections. During the cold and sweating stages of fevers, &c., the drinks should be warm.

Apoplexy and Affections of the Head. There is an intimate sympathetic connection between the digestive organs and the brain; hence whatever excites or deranges the functions of the first, will react upon the second. In every affection of the brain, therefore, the food ought to be light and easy of digestion, and not liable to stimulate either the circulation of the blood or the nervous system. When the disease is of an acute character, the food should consist of small quantities of the various amylaceous or farinaceous substances, with tea or coffee; if it be of a chronic nature, or if there be simply a determination of blood to the head, the limitation in point of quantity need not be so great; but animal food, wines, spirits, &c., ought to be avoided.

Diseases of the Heart and Rheumatism. Acute rheumatism is often complicated with disease of the heart; giving origin to an intractable and generally fatal affection of this organ. The treatment of rheumatism ought therefore to be conducted on the most antiphlogistic principles. Animal food of all kinds should be avoided, as tending to increase the quantity of blood in the body and to promote the growth of muscular organs, such as the heart. Arrowroot, sago, or other amylaceous substances, with tea or

coffee constitute the most appropriate diet during the acute stage of the diseases. Chronic affections of the heart are frequently complicated with indigestion to a greater or less extent, which often aggravates the distressing symptoms, and may increase the organic alterations going on in its structure. In general, the rules laid down for the treatment of deranged digestion will apply; but if an enlargement of the heart be the disease, animal food, and wines or spirits, ought to be used in small proportions; and in some cases altogether avoided.

Pulmonary Consumption. The dietetic treatment of this disease must be varied according to its stage or progress of advancement. In the primary stages, if there be no derangement of the digestive organs, light farinaceous substances, with a proper proportion of animal meat, may be allowed. Fish, milk, eggs, &c. may be occasionally substituted for the meat. Ass's milk, as containing a small proportion of butter and curd and much sugar, is, with justice, esteemed a favourite aliment for consumptive persons; being light and easily digested. When any tendency to pleurisy is evinced by a sharp pain in the chest, and other signs, solid animal food ought to be omitted, until this is removed. In the latter stages the diet may be nourishing, and may contain an average allowance of animal food; but great care should be taken not to overload the stomach, so as to excite indigestion or quicken the breathing. Diarrhœa is very apt to occur at the later periods of the disease; on this account fruits and green vegetables should be sparingly used; for if once excited, it is always difficult to cure, and frequently can only be alleviated.

Diarrhœa, Dysentery, Cholera. In these affections the stomach and bowels are in a state of high irritation, and their functions of assimilation are more or less impaired. Articles of diet, which, during health, are digested

with ease, produce in such diseases great distress and aggravation of the symptoms. It is fortunate that nature has provided a check to any improper indulgence; for, in extreme cases, nausea or vomiting is a common accompaniment, and, in almost all, there is a disrelish for food. Tea or coffee, with bread thoroughly toasted, arrow-root, isinglass-jelly, containing only aromatics and a small portion of sugar or milk diluted with water, may be used as diet in these affections. The drinks may be included in the following list, namely, toast water, soda water, pure water, and occasionally infusion of mace (mace tea), where there is nausea or vomiting.

Constipation. It is a common and correct opinion that, when the bowels are slow in their action, it is better to effect the desirable change by means of diet than medicine. Attention to diet alone sometimes fails in effecting this, but among healthy individuals, when accompanied with sufficient exercise, pure air, and regularity of life, there are few instances of its inefficacy. When the digestive organs are healthy, the use of fruits, green vegetables, potatoes, barley, or oatmeal *porridge*, soups, along with the other ordinary alimentary substances, will generally, when accompanied with the other circumstances mentioned, produce a regular action of the bowels. But if the functions of the stomach be deranged, and green vegetables, soups, &c., be excluded from the alimentary list, then it is productive of less discomfort, and is less injurious to the system, to employ gentle laxatives.

Urinary Diseases. These constitute a class of diseases in which diet plays a conspicuous part in their cure or aggravation, and which sometimes require considerable nicety in their discrimination.

Diabetes. In this disease the functions of the stomach are so changed that the larger proportion of vegetable substances, in place of being digested, are more or less

converted into sugar. This is only the case, to a limited extent, with many animal substances; hence the latter have been found most advantageous in the treatment of this affection. The larger portion of the diet may consist of beef, mutton, bacon, or indeed of the flesh of any other alimentary quadruped or bird, eggs, and milk; but as vegetable substances are also necessary, bread, rice, sago, arrow-root, &c., ought to be preferred. Pure water, in small quantities, is the best of all diluents, and when tepid the temperature is a check upon its indulgence to excess. The urine is very characteristic of the disease, being sweet, of a greenish-yellow colour and peculiar odour, of great density, and readily fermenting with yeast.

Oxalic Acid in the Urine.—It is often difficult to discover this affection, which is generally considered not common; although Dr. Bird, in a recent paper on the subject, has formed a different opinion. According to Dr. Prout, the urine is generally transparent, very free from sediment, of a pale citron-yellow or greenish colour, and generally of moderate specific gravity, except when increased in quantity, when its density is less. According to Dr. Bird's recent researches, the urine is always acid, has often an amber hue, and octohedral crystals are detected in it by the aid of the microscope. There are also generally present some of the prominent symptoms of dyspepsia; such as flatulence, irregular action of the heart, intermission of the pulse, craving for food, which is not disposed of so rapidly as in diabetes, although more quickly than in some other forms of dyspepsia. When there is stone in the kidneys or bladder, discharge of blood sometimes take place; and in such cases the nature of the affection is more easily ascertained. Sugar, and substances containing saccharine matter, are generally considered improper articles of diet in this disease, as liable to gen-

erate oxalic acid; and for a similar reason those vegetable substances which contain it, such as sorrel, stems of the alimentary rhubarb, &c. Tender animal food, fish, along with bread, rice, sago, arrow-root, &c., should be chiefly employed. Pure water is the best drink, and it ought to contain no lime in its composition; for this might tend to produce the oxalate of lime calculus. Dr. Prout recommends, in some of these affections, as well as in some cases of diabetes, good porter, or sound and dry wine. When the urine contains urea in excess, a diet similar to the above may be employed.

Insipid Diabetes, or Hydruria.—This disease is generally characterised by a copious secretion of watery urine, and instances of its irregular occurrence may sometimes be observed in hysteria. It is often a very obstinate affection, and like saccharine diabetes, resists many varieties of treatment. The specific gravity of the urine is frequently very low, and Dr. Prout ranges it from 1001 to 1010. There is generally a deficiency of urea in the urine of such patients, and it often differs little in appearance from common water. The diet best adapted for such cases should consist of a considerable proportion of tender animal substances, with a moderate allowance of bread or other farinaceous aliments. As a general rule, the dietetic treatment ought to be similar to that recommended in saccharine diabetes; but the proportion of animal food need not be so great.

Disease of Kidneys with Dropsy.—Although much has been done of late years, to elucidate the nature and treatment of these affections, they are still not thoroughly investigated as to their chemical pathology; but as a general rule, the urine is albuminous, and this, along with some of its other qualities, constitute the most valuable signs we possess of granular disease of the kidneys. In the advanced stages of these affections, there are generally

some obstinate dyspeptic symptoms present; the rules, therefore, which have been given under the article Indigestion will apply to such cases.

In the incipient stages, if no acute inflammation be present, a moderate proportion of animal food, along with the various farinaceous substances, may be allowed, to which may be added some of the more tender green vegetables, if they do not produce indigestion. But in the latter stages, when dropsical swellings are obstinate, and complicated with diarrhœa, or other serious derangement of the digestive organs, the greatest attention to diet should be given. Tender animal substances, fish, bread, rice, and the various amylaceous products, may be employed, along with a moderate allowance of sound sherry, diluted with water. In some cases, a table-spoonful of brandy, or gin, largely diluted with water, will be found to agree better with the digestive organs than wine.

Lithic Acid Sediments, Gravel in the Urine.—The lithic acid deposits in the urine are found in the form of amorphous sediments or concretions, and assume three different modifications of colour, namely, yellow, red, and pink; and in such cases the urine is generally acid. The yellow amorphous sediment is often deposited after irregularities in diet, and the urine does not in general differ much from that in health. The red or lateritious generally indicates a febrile state of the system; while the pink is very frequently associated with some organic disease.

The amorphous sediments are in general symptomatic of some other disease, which consequently requires its own appropriate dietetic treatment; while the crystallised or massive concretions indicate great derangement of the urinary organs themselves. When the amorphous sediments are only occasional and small in quantity, no deep-

seated or permanent disease is indicated by them; but if deposited in large quantities and pretty constantly, more especially if white or pinkish in colour, some organic or serious disease may be apprehended. Dr. Prout remarks that the pink sediment is rather rare, and generally indicates the presence of chronic visceral affections. I have remarked it in affections of the liver, and in several instances of dropsy from enlargement or other disease of the heart. The rules which have been given respecting the treatment of deranged digestion, should here be strictly observed, not only in regard to quality but also quantity; for an excess of food, even of the most digestible kind, may cause the deposition of lithic acid from the urine. In general, a moderate proportion of animal and farinaceous substances may be employed, along with the usual alimentary liquids, tea or coffee. Wine or ardent spirits are in general injurious except in very moderate quantities; and when taken to excess often cause great aggravation of the complaint. Fatty substances, malt liquors, milk, fruits, green vegetables, acescent and sweet wines, and hard water, ought to be avoided.

Phosphatic Deposits in the Urine.—In this affection, the deposition consists very frequently of the mixed phosphates, or of the phosphate of magnesia and ammonia and the phosphate of lime. The disease is sometimes of a general character, but more frequently it is associated with disease of the bladder or prostate gland. The urine and deposits vary in appearance, according to the predominance of the one or the other salt. When the triple phosphate is most abundant the deposit is more or less crystallised; but when the phosphate of lime predominates, it is found in the form of a whitish or yellowish-white powder; or sometimes containing crystalline granules, when the coats of the bladder have become

diseased. The urine is generally of a pale colour, frequently alkaline when newly passed, and more abundant than natural. When the secretion is very great, little or no deposit takes place without the application of heat; but when moderate, its formation often takes place in the bladder, and the urine is muddy when passed. Dr. Prout remarks that some authors, from chemical hypothesis, have recommended a vegetable diet in this disease, or one as free from nitrogen as possible, in order to correct the alkalinity of the urine. Experience, however, has shown that vegetable aliments alone are not calculated to support the system sufficiently under this formidable affection. A mixture of animal and farinaceous diet is best calculated to support the vital powers, and in general it agrees better with the digestive organs than one composed of the ordinary dietetic vegetables. A portion of wine is often beneficial, and Dr. Prout recommends Moselle or Bucellas, as well as sound cyder and perry; and he considers that liquids containing malic acid are sometimes very beneficial in arresting the deposition of the phosphates. According to the experiments of M. D'Arcet, the mineral waters of Vichy, and soda-water surcharged with carbonic acid gas, are very useful in such affections.

Corpulency.—When all the functions of the body are properly balanced, very little fatty matter is deposited in the system; although a certain amount of this is by no means incompatible with what is denominated ordinary health. In persons of common size and vigour, the proportion of fat has been computed to average from one-tenth to one-fifteenth of the weight of the body; but in extreme cases of obesity, this has amounted to about four-fifths, as in the case of Mr. Lambert of Leicester. When the accumulation of this principle becomes excessive, derangement of the secondary assimilation is going

on, which is often the premonitor of some serious disease. The same holds true with extreme leanness, which generally indicates some defect in the primary or secondary processes of digestion. A large majority of these instances of extreme obesity are owing to over-feeding, combined with indolence, or indulgence in the use of fermented liquors; but it is also true that a certain proportion of persons become fat, where excess of no kind is practised. In general, however, it will be found, that in such cases a due proportion of exercise has not been taken. The rules, therefore, to be observed for the removal of obesity may be deduced from these principles. The aliment should consist of the various vegetable substances usually employed, and fish, with only a small amount of animal food or animal preparation, and little fatty or oily matter should be used. Fermented liquors and ardent spirits ought to be avoided; for experience proves that the large proportion of carbon they contain is readily converted into fatty matter; and this view is supported by the latest and most enlightened theory of secondary assimilation.

Quantity is also an important element in the diet of such persons, and this, in an individual of ordinary weight, should not exceed twenty-eight or thirty ounces daily. Exercise of an active kind is also necessary, and it ought to be continued for at least two or three hours every day, and of all the varieties in common use, walking is the best. Indeed, so important is smart or laborious exercise, if continued a sufficient length of time, that it is rare to meet with a corpulent person of such habits or occupation. Much sleep also favours obesity, on the same principle as indolence; for less carbon is consumed by the lungs, skin, &c., during that period, from the comparative inactivity of the functions connected with these organs. The amount of sleep should there-

fore be restricted considerably within the ordinary limits.

Dr. Prout is of opinion that the production of gallstones is owing to a derangement of the oleaginous or fatty assimilation, and recommends a similar diet and regimen for the prevention of future attacks of this painful and sometimes formidable affection; but as this disease is often accompanied with weakness of the digestive organs, the vegetable part of the diet ought to consist chiefly of the farinaceous kinds.

Worms.—Indigestion, in some form, almost uniformly accompanies the existence of worms in the intestines; and from this fact may be deduced the inference, that their generation and growth are promoted by the presence of acid and imperfectly digested matters. The diet ought therefore to be conducted on the same principles as in the treatment of indigestion. Green vegetables, fruits, oatmeal, and all acescent substances, should be avoided. The diet may consist of bread, rice, the finest quality of pease-meal, sago, with a proper allowance of animal food, including milk and eggs.

Cutaneous Diseases.—There are many chronic diseases of the skin that seem to be little under the influence of diet; but those of an acute or inflammatory kind are often increased, if not sometimes produced, by an indulgence in animal food, fermented liquors, ardent spirits, green vegetables, salt fish, and meat of any description that has been long preserved. As a general rule, all substances difficult of digestion should be avoided; and if indigestion co-exist with the disease, this must be carefully attended to as an important step in the cure. There is one affection closely allied to skin diseases, which may be specially noticed, as often accompanied with derangement of the assimilating functions, namely, *furunculi*, or boils. In young persons, the habit is sometimes rather

full during the presence of this affection; but although this shows that the blood is sufficiently supplied with nutriment, it will, in many cases, be found that some irritating principle is generated in the digestive organs. This, however, is more apparent when the disease occurs in old individuals, or in persons of a cachectic or broken-down constitution; the functions of their digestive organs ought therefore to be carefully regulated. A moderate allowance of animal food, with bread and other easily-digested farinaceous substances, will be found beneficial; to which may often be added, with great advantage, one or two glasses of sound wine daily.

Suppurating Wounds and Ulcers.—In some wounds and ulcers, the discharge of matter is very copious, and the system consequently becomes much exhausted. It has therefore been found that a generous diet, containing a considerable proportion of animal matter, is most beneficial. This plan is however sometimes pushed far beyond the powers of the digestive organs, particularly in point of quantity; in consequence of which, indigestion and an unhealthy state of the diseased parts are produced. The limits of healthy assimilation should therefore never be exceeded; and when a large amount of stimulating nutriment is required, wine should form a portion of the aliment. In cases of ordinary wounds and ulcers, provided the general health be good, no particular deviation from the common diet is in general required; but if accompanied with derangement of the digestive organs, modifications of it, adapted to this state, ought to be employed.

Accidents, Fractures, &c.—In healthy individuals of regular habits, the dietetic treatment should be conducted on the same principles as in inflammatory diseases; at least for some time after receiving a serious injury. Farinaceous substances, arrow-root, sago, &c., tea or

coffee, may be allowed; and in many cases beef-tea is productive of no injurious excitement. The treatment, however, requires to be much more stimulating in persons of intemperate habits; and inattention to the important difference of constitution between regular and irregular individuals, sometimes induces *delirium tremens*. In such cases a certain proportion of wine or spirits must be allowed, according to the previous habits of the patient, accompanied with a moderate quantity of tender, easily-digested animal food, and farinaceous substances.

DIET AFTER CHILD-BIRTH.—Nurses and old women very frequently entertain false notions upon this subject, and those who are under their management sometimes suffer severely by reason of a misplaced confidence in the doctrines of these sage individuals. After child-birth, in a considerable number of cases, there is a feverish or excitable state of the system for some days; which, by indiscretion in diet, or exposure to cold, might readily assume an inflammatory character; a state well known to be highly dangerous to the patient. It is therefore obvious that a generous diet and stimulating drinks ought not to be hazarded; for though the lady may be considered weak, and though nourishment may be thought necessary for other reasons, these trifling advantages are completely overbalanced by the risks which attend their employment. For the first four or five days, the diet should consist of tea or coffee, milk, bread, panado, arrow-root, sago, rice, or tapioca. After that period beef-tea or chicken-soup may be added; but no solid animal food should be taken, until a week of the confinement has elapsed. Chicken, beef-steak, or mutton-chop, and eggs, may then be allowed to a moderate amount; with a glass of sherry or a little good porter, if there be any peculiar weakness.

INDIGESTION.—See page 4.

CHAPTER VIII.

DRINKS OR DILUENTS.

WATER is a necessary constituent of animated beings; for without it the circulation of the blood could not be carried on. The watery portion of the blood is constantly escaping from the body by various channels; such as by the lungs in the form of vapour, from the skin by the sensible and insensible perspiration, and from the kidneys. It is therefore necessary that this waste be supplied. Dr. Dalton, from experiments made upon himself, calculated that five pounds of water are required as a vehicle to introduce one pound of carbon and azote together into the circulation. This statement, of course, implies absolute carbon and azote; for even the most dry alimentary substances contain water as a constituent. The requirement of water, as a necessary supply for the system, depends as a general rule upon the appetite of thirst. In febrile diseases, the thirst is greatly increased, and this is readily explained by the fact, that a larger proportion of water is carried off by the lungs, from the quickened respiration, and also from the skin by insensible perspiration. Violent and continued exercise causes thirst on a similar principle; for it produces accelerated breathing and increased perspiration, either in the sensible or insensible form. Thirst is therefore as necessary a signal for the supply of water, as hunger is for a supply of food; both of these principles being required for the continuance of life. The importance of water in preserving life is well known; and repeated experiments and observations have shown that the higher classes of animals can survive much longer with-

out food, if liquids be supplied, than when deprived of both. Although water cannot strictly be called an alimentary body, it is indirectly as requisite to support the fulness and efficiency of the animal fabric, as food which contains carbon or azote. Besides the use of water in supporting the physical weight and muscularity of animals, by its mere position in the vessels, a certain portion of it is necessary in the process of digestion; for solid food requires a certain amount of fluid to reduce it to a proper consistency.

Much drink taken during or after a meal, is injurious to the process of digestion; for though the excess of water is removed very rapidly by the veins and absorbents of the stomach, yet in all cases chymification is retarded, and in dyspepsia is much protracted beyond the usual period. From twelve to sixteen ounces of liquids may be considered an average amount for a healthy individual, but if the digestive organs be weak, three-fourths of this quantity will be sufficient. The temperature of the drink is another circumstance requiring attention. Cold liquids are, in general, most grateful to persons who are thirsty, and a smaller quantity of cold than of warm water will assuage thirst, although the first, from its agreeable quality, is more frequently taken to excess. In cases of indigestion, much cold water ought not to be taken at a draught; for this lowers the temperature of the stomach too suddenly, and is liable to occasion defective chymification. The same holds true with water at a high temperature; for though it is sometimes productive of comfort, the powers of the stomach may afterwards be enfeebled. The periods of drinking, as a general rule, ought to be regulated by the appetite of thirst; but in dyspeptics, drinking much or at irregular times, is apt to occasion uneasiness in the stomach or bowels. Such persons ought therefore to swallow only a small portion

of liquid at a time, or the mouth and throat may be frequently gargled with cold water; this practice being often successful in assuaging thirst.

Cold water when drank to excess during profuse perspiration, more particularly if this be accompanied with exhaustion after protracted and laborious exercise, is apt to produce dangerous effects. This danger is in many cases lessened, if not altogether prevented, by keeping up the exercise for some time after the draught has been taken; a fact well known to postilions. Another method is adopted by many persons under these circumstances, namely, the addition of a portion of ardent spirits to the water; which, in general, prevents any injurious effects, unless the quantity of the latter be very great. It is a practice, however, not to be recommended except in particular cases; and it is much safer to take a single mouthful at a time, and repeat this at intervals, until thirst is allayed.

Water is the basis of all the different kinds of drinks, and the less of foreign ingredients they contain, with the exception of pure acids, they extinguish the sensation of thirst the more effectually. Indeed, there can be very little doubt that water containing much saccharine matter in solution, though it may for a few minutes abate the sensation, afterwards frequently increases it.

Drinks are divided by some writers on the subject into,

1. Diluents, those which consist chiefly of water, or which hold in solution only a small portion of acid, saccharine, or other foreign matter; as toast-water, or soda water.

2. Those which hold in solution a considerable quantity of nutritious matter; as milk, tea, or coffee.

3. Fermented liquors, and various beverages. The first, and some of the second classes, shall here only be taken

notice of; as the others will be found described under other sections.

WATER.

WATER is the simplest diluent that is known, and is unquestionably the most natural, as well as the best beverage for man, during health as well as during disease. In order to free water of every impregnation, it is necessary to distil it; but after being submitted to this process, it is not agreeable to the taste, from the loss of atmospheric air and carbonic acid gas. Distilled water was, at one period, strongly recommended by some physicians; but its superiority is now considered a fanciful opinion, from the almost universal employment of pure spring or river water.

RAIN AND SNOW-WATER—resemble distilled water in as far as they contain no saline impregnation; but differ from it in being liable in some situations to vegetable, animal, or mineral impregnation floating in the atmosphere, &c., and by holding in solution atmospheric air. Snow-water was at one period supposed to produce *goitre*, but this opinion appears to be groundless. Dr. Paris states, that "this strumous affection occurs at Sumatra, where there is no snow; while, on the contrary, the disease is quite unknown in Chili and Thibet, although the rivers of these countries are supplied by the melting of the snow with which the mountains are covered." Rain and snow-water may be strongly recommended as perfectly pure and salubrious, and fit for every domestic use, if collected in the country, and not from new leaden roofs.

SPRING WATER—generally contains muriates, sulphates, and carbonates of lime, soda, and magnesia, and is distinguished into hard and soft. Waters which contain a 4000th part of mineral impregnation, are termed hard, and are unfit for ordinary domestic purposes. Soft

spring water is most pure when it rises out of siliceous earth, beds of gravel, sandstone, or trap rocks; and in this country it seldom contains more than an 8000th part of mineral impregnation. It contains also a small portion of atmospheric air and carbonic acid, which render it agreeable to the taste. The importance of springs of soft water has been felt and acknowledged by all nations, particularly by those who inhabit tropical countries, and many of the ancient settlements were located in their vicinity. Hard waters are apt to induce derangement of the health, particularly indigestion and diarrhœa, and should be scrupulously avoided by those who have calculous diseases.

Well Water—is very similar to spring water, but when the well has been recently constructed it is liable to aluminous impregnation from the bricks which are used to line its sides; old wells are, therefore, generally more free from impurity.

River and Lake Water—is generally derived from the various springs which flow into rivers and lakes; and on this account their waters are similar to those of springs. From the long agitation of the water, however, it contains less atmospheric air, carbonic acid gas, and carbonate of lime. River water, when near a large city, is liable to be contaminated by the impurities which flow into it. It thus may contain much animal and vegetable impregnation, and though apparently very pure after filtration, yet when kept for a day or two may become muddy, and exhale a disagreeable odour. It is also liable to become impregnated with organic matter and salts, when it passes over an alluvial soil for any great distance. In general, however, river and lake water is perfectly salubrious, although more vapid than spring water.

Stagnant Water—exists in small lakes, pools, ditches, and marshes. It is, in general, soft, but is impregnated

with animal and vegetable substances in a state of decomposition; it is therefore, under ordinary circumstances, unfit for dietetical uses.

PURIFICATION OF WATER.—Water may be purified by various means. The usual method is by filtration through sand or gravel, or by alternate layers of charcoal and sand. Boiling is recommended when animal or vegetable matter is present; or allowing the water to stand in a charred vessel until decomposition takes place, the impurities being then separated. Water sometimes, although by no means frequently, becomes contaminated by passing through leaden pipes; and this generally happens when it is very free from mineral impregnation, as in rain or spring water. When this is found to occur, cast metal may be substituted for the leaden pipes, or leaden pipes coated with tin, an extremely thin coating of which has been found sufficient.

TOAST WATER—is made by infusing toasted bread or biscuit in boiling water. The bread ought to be cut into thin slices before it is toasted, and should be slowly but very thoroughly browned. When this is not attended to, the water dissolves too much of the starchy principle, and the drink is heavy and unpleasant. Its chief value seems to reside in the aromatic principle developed during the toasting of the bread, being the source of its flavour and other qualities. Sir A. Carlisle recommends biscuit in preference to bread for its preparation, and many persons think it superior; but bread is equally good, and more easily managed. Next to pure water, this forms one of the most salubrious and agreeable drinks in ordinary use, and may be employed under all circumstances and situations, as it contains nothing calculated to produce indigestion, or to excite the system. It is superior to water in diseases accompanied with nausea, retching, or vomiting, more particularly if

the bread be very slightly charred. Charred bread is useful in correcting the taste of water spoiled by long keeping, and is sometimes employed for this purpose by sailors.

GRUEL—is prepared by boiling oatmeal or groats with water, and it is usually seasoned with acids, jelly, sugar, &c. By this process the starchy principle and sugar of the oat are dissolved by the water, and either form a thickish liquid or a jelly, according to the proportion of ingredients employed. It ought always to be made thin and watery, and, in general, the addition of butter, sugar, and substances containing these, should be avoided, unless the preparation be intended as an alimentary compound, and not as a diluent. A small table-spoonful of oatmeal or groats will be a sufficient quantity for four pints of water, and these may be boiled for five minutes and strained. Gruel, when watery, may be used as a very safe and agreeable drink in the large majority of diseases; but when there is any weakness of the digestive organs, particularly if this be accompanied with acidity, it should be avoided. A very pleasant drink may be formed from oatmeal, in the following manner:—Mix a tea-spoonful of oatmeal with a pint of butter milk, then add an equal portion of boiling water to the liquid and stir. By this process the curd of the milk is coagulated, and the diluted whey, containing the soluble parts of the oatmeal, may be decanted.

BARLEY WATER—is made by boiling one ounce of pearl barley in two pints of water, down to one half. Lemon juice, raisins, figs, currant jelly, &c. are sometimes added to this decoction; but although they render it more agreeable, it becomes less light as a diluent. If there be any weakness in the digestive organs, these ought to be omitted, or only used to a very limited extent. Barley water is supposed to be better adapted

for diseases of the urinary organs than other drinks, on account of its demulcent or softening qualities. This opinion, although common, is not established; but the diluent is equal to any other usually employed in such affections.

LEMONADE.—This beverage consists of a dilute solution of lemon juice in water. Sugar is also generally added, but if at all considerable in quantity, it uniformly increases the tendency to drink. Pure citric acid, however, is superior to lemon juice in the formation of this drink, as it is less liable to produce fermentation, flatulency, or other symptoms of indigestion. In both cases, the water should be only very slightly acidulated, and if a little flavour be agreeable, a small piece of lemon peel may be added to it. When thus prepared, it will be found a very cooling and pleasant drink in febrile diseases; and ought in such cases to be preferred to the undiluted juice of lemons, oranges, or other similar fruits, which generally deranges the digestive organs.

A drink is also made from tamarinds and currant jelly, by dissolving them in warm water; but they generally contain too much sugar, and are thus not well adapted for the purpose.

EFFERVESCING LEMONADE—is made by adding tartaric acid and oil of lemons to water highly charged with carbonic acid gas. It is too saccharine in its qualities for a patient's drink; but a small quantity may, in some cases, be allowed on account of its agreeable properties.

SODA WATER.—This is a dilute solution of bicarbonate of soda in water, which is highly charged with carbonic acid gas. A pint of water seldom contains more than forty grains, but frequently much less, of the soda, and the quantity of carbonic acid also varies according to the efficiency of the apparatus employed in its manufacture. When well prepared, the cork, when freed from the

wire and slightly loosened, should be propelled from the bottle by the force of the contained gas. Some manufacturers of soda water add a little carbonate of ammonia to give it pungency. It is occasionally imitated by druggists, who, for this purpose, add bicarbonate of soda and tartaric acid to the requisite quantity of water contained in a bottle, and immediately cork it, while the wire is applied in the usual way. I have noticed this occasional fraud, chiefly because the preparation is not so well adapted for the treatment of cholera, diarrhœa, and other affections of the stomach and bowels, as real soda water, exciting more irritation in these organs. Soda water, when of good quality, is agreeable, light, and, next to pure water, one of the best drinks that can be employed under almost all circumstances. In cases of dyspepsia, it is useful in correcting acidity, and the carbonic acid gas communicates a gentle stimulus to the digestive organs. In all diseases accompanied with retching, vomiting, or irritability of the digestive organs, such as cholera, diarrhœa, dysentery, &c. it is a valuable and grateful drink. In such cases, however, the quantity taken at once ought to be small, such as a wine-glassful; but this rule applies to every other diluent. Soda water has also been strongly recommended in the deposition of the phosphates from the urine; the excess of carbonic acid keeping the earthy salts in solution, while the deposition of lithic acid is prevented.

Imperial.—This term is applied to a solution of cream of tartar in water, containing a little refined sugar. This is necessarily a very dilute solution; for one part of this salt requires about 234 parts of temperate water, (60° F.) to dissolve it. It forms an excellent drink in febrile and inflammatory affections, and is useful in dropsy. In irritability of the stomach and bowels, it is liable to disagree with the patient.

TEA.

Thea Viridis.—Ternstromiaceæ.—THE TEA TRIBE.—The native country of the tea shrub has not been exactly ascertained: but its cultivation is almost exclusively confined to China, Japan, and some of the neighbouring islands. It is also reared in Java to a small extent, and has lately been discovered in Upper Assam, in the East India Company's territories, the climate of which is similar to that of China; and experiments are in progress for its successful cultivation in that district.

It is generally believed by botanists, that all the different kinds of tea imported from China into this country, are the produce of the *thea viridis;* the differences depending on soil, climate, the different ages at which the leaves are gathered, the mode of drying, &c. This shrub is most luxuriant in valleys, on the banks of rivers and the bases of mountains; but it can endure a considerable variation in temperature, and its quality is said to be best when grown on the slopes of a hill. In China it is cultivated in fields; but in Japan it is only planted round thin borders. The plants are raised from seeds, and little care is bestowed on their cultivation except freeing them from weeds. The leaves are not collected until the shrub is about three years old. According to Dr. Sigmond, in the common tea plant the gathering of the leaves takes place early in the spring, and three crops are obtained during the summer. The first is collected before the leaf has fully expanded; this is named Pekoe, is exquisitely flavoured, and the more flowers it contains the more fragrant is the aroma. Trees furnish this variety of tea until their sixth year. The next gathering is in May, and is named Souchong. About six weeks afterwards, Congou is collected, and from this is selected a variety

named Campoy. Bohea is a preparation of the later grown leaves, and is often inferior in strength and flavour; although occasionally of excellent quality. Green teas undergo a similar harvest. Hyson is prepared from the tender leaflets. Gunpowder is a Hyson gathered and rolled with extra care. Twankay consists of the older leaves, and is rolled with less care. After the leaves are collected, they are put into bamboo baskets and exposed to the sun for two or three hours. They are then rolled between the fingers and afterwards dried in flat iron pans; which latter process is repeated two or three times. The tea is then sorted into different qualities; but before it is exported to Europe, it frequently undergoes another heating previous to its being packed, that it may be thoroughly freed from moisture. A sea voyage is said to deteriorate its aroma, and what is consumed in Britain is considered inferior to tea sent to other countries, such as Russia, by land carriage. It is asserted that some tea merchants in this country revive the flavour of their tea, by placing the boxes which contain it in a room heated to a pretty high temperature. It has been supposed that the colour of green tea was owing to an impregnation with copper derived from the copper plates on which it was dried; but this opinion appears to be destitute of foundation, as it is well known that iron pans are generally employed. Dr. Lettsom, however, is of opinion that some green vegetable dye is employed to colour green teas; and there appears to be little doubt that the fumes of indigo are often used for this purpose. The Chinese also flavour tea with aromatic substances, such as flowers, gums, &c.

The tea shrub is an evergreen, resembling the myrtle, and attaining the height of from six to eight feet. It has large yellow fragrant flowers, and elliptical oblong crenated leaves, which have a light green colour.

Tea, at one period, was frequently adulterated with the leaves of the whitethorn, blackthorn, sloe, ash, elder, &c. Mr. Accum states that the tea leaf is slender, narrow, deeply serrated, and its extremity acutely pointed, while its surface is smooth and glossy. The leaves of the whitethorn and sloe are more rounded and obtusely pointed; their surfaces are more uneven, and their colour is a dark olive-green. I have met specimens of tea that were adulterated with peat; and also one which contained iron filings. Green tea, according to Frank, contains in 100 parts 34.6 tannin, 5.9 gum, 5.7 vegetable albumen, 51.3 vegetable fibre, besides salts and a volatile oil, which is the source of its flavour. Black tea contains more tannin or astringent matter, namely, 40 per cent. A watery infusion of green tea has a greenish tint; while that of black tea is of an orange brown colour, and both have an astringent taste and agreeable flavour; but the green is most esteemed. Water which contains any salt of iron gives a black or inky colour to an infusion of tea, from the astringent matter in its composition combining with the iron; such water ought therefore to be avoided when it is infused. Hard water is also unfit for this purpose, for it does not extract the soluble matter of the leaf so thoroughly as soft water. Mr. Donovan has made some excellent remarks upon the making of this infusion, which it may be useful to quote. He says that "two conditions only are required; that the water shall be boiling and that the teapot shall be of a material capable of retaining the heat. I conceive (he says) that the British nation lost several millions of money by the introduction, many years since, of a teapot made of unglazed earthen ware, the colour of which was black. Its effect was to disperse the heat by radiation with great rapidity; the water cooled almost below the extracting point, and the chief value was thrown away in the residual leaves."

The same author recommends a silver teapot, and next to it one of German silver; but it is of little consequence what the metal is, unless it be kept perfectly bright.

Uses. Tea, from its universal use, may be considered one of the necessaries of life, in this and many other countries. It was introduced into Britain about the year 1666, and a duty of eightpence per gallon was laid upon the liquor, made or sold in coffee-houses. It has been used by the Chinese and Japanese from time immemorial, and at present is employed in Europe to an enormous extent. Its effects on man have excited much difference of opinion and controversy among authors. It has been said to possess narcotic or poisonous properties, and some modern writers seem to favour this opinion, but state at the same time that this property is dissipated by the heat to which it is exposed during the process of drying. It certainly possesses stimulant and exhilarating qualities, combined with some astringency; and it produces in some individuals, especially when taken late in the evening, an inability to sleep, or watchfulness. Those who lead a sedentary life are most subject to these effects; while they are rarely noticed in those engaged in laborious occupations. Tea, when used moderately, is by no means injurious to the health, and rather tends, from its stimulating qualities, to promote the functions of the digestive organs. In my experience, the injurious effects of tea are most frequently owing to the large quantity of weak saccharine fluid which is taken, and rarely to the strength of the infusion. In individuals of weak digestive organs, a superabundance of liquids in the stomach is very injurious to the process of digestion, particularly if they be saccharine; for, in such cases, the mass speedily passes into acescency, which is generally productive of pain or uneasiness. Indeed, in some cases of weak diges-

tion, a small quantity of a pretty strong infusion of tea, with little sugar, will be found advantageous as a stimulant, and in relieving the languor which often accompanies this state.

COFFEE.

Coffea Arabica.—Cinchonaceæ.—The Cinchona Tribe. —The coffee shrub is generally considered a native of Ethiopia and Arabia Felix; and Mr. Bruce, the traveller, states, that it grows spontaneously in Caffee, a province of Narea in Africa. There are no records in ancient history which lead us to believe that the Greeks or Romans were acquainted with this tree, or its berry; but the latter was known in Europe for a long period before the plant which produces it was described. Coffee was in vogue in Constantinople about the year 1554; and in the following age it was introduced into Europe. The first coffee-houses were opened in London in 1652, but it is said that they existed in Italy a year or two before this period. The seeds for cultivation were first procured from Mocha, by the governor of Batavia, and were sown in the island of Java. These produced several plants, some of which were sent to the botanic garden at Amsterdam, about the year 1610, and from it the West India islands were supplied. The coffee tree is frequently cultivated in this country, in hot-houses, for the sake of ornament; and it both blossoms and ripens its fruit. It is propagated by the berries, which must be sown soon after they are gathered, or they will not vegetate.

Mr. Don states, that richness of soil lessens the flavour of the seeds, and that coffee produced in the dry arid climate of Arabia is always superior to that of the West India islands. The coffee tree is more extensively cultivated in Barbadoes, St. Domingo, and some of the other West India islands, than in Jamaica; and in these

places the berries are gathered when just about to drop from the trees, and sown immediately. In three years the trees produce fruit, and continue to do so for a considerable time. The coffee tree is an evergreen from five to fifteen feet in height, has sweet-scented white flowers, and red cherry-formed berries, which contain two seeds or kernels, covered with a thin pellucid pellicle. In Arabia, the fruit is dried by the heat of the sun, and the outer coat is removed by a large stone cylinder. In the West Indies, the berries are pulled by the negroes with their hands, at three different periods; as the fruit does not all ripen at the same time. The kernels are sometimes freed from the pulp, by allowing the latter to ferment in the sun; while by another method, the pulp is at once separated from the kernels by a mill. The seeds are afterwards dried and freed from the pellicle which covers them. According to Schrader, coffee unroasted contains a small quantity of volatile oil, gummy extract, tannin, resin, a fixed oil, a crystalline body named caffeine, caffeic acid, vegetable fibre, and salts. Robiquet and Boutron state, that green Martinique coffee contains about one-eighth of its weight of fixed oil, and that, after roasting, this oil is charged with the aromatic principle and taste of the coffee. They have also shown that acetic acid is generated during the process of roasting, and that the acid in green coffee is the gallic. By the roasting of coffee, it is partially altered or decomposed, and a peculiar aromatic volatile principle or oil is formed, which is dissipated or volatilised when the ground seeds are much boiled with water. The roasting of coffee is generally conducted by persons who attend to it as an occupation, and consequently it may be presumed that they are well acquainted with the process. At the same time, it is quite obvious that they, or those who employ them, have a direct interest in under-roasting, by the saving of loss

in weight. A proper comprehension of its importance is therefore necessary. Mr. Donovan states, that if sixteen ounces of raw coffee be roasted until reduced to fourteen, the powder obtained from it will be brownish, with a tinge of orange, and an infusion of it poor and raw; but that if fifteen ounces of raw coffee be reduced to twelve, by a gentle heat, this combines the greatest number of advantages. Anything more than this makes it too bitter, anything less does not develop its aromatic and stimulating properties sufficiently. Thus one-fifth of the weight is lost by the process. The coffee, when whole or ground, has a light chocolate colour, and the liquid prepared from it will be bright brown, with a tinge of orange. The same author recommends the following plan in the roasting of coffee. The raw coffee should first be deprived of its water by putting it into flat iron pans, placed over a gentle fire; then each kernel ought to be broken into three or four fragments, and the whole afterwards transferred into the roasting apparatus. By this method, the coffee will be more regularly and thoroughly roasted than by the ordinary plan; for by the latter, the outside of the kernel is often too much burned, while the interior is raw. As roasted coffee contains a volatile aromatic principle, it should be carefully excluded from the air, and ought not to be kept in the state of powder for more than a few days, and even for that length of time only in a jar or bottle closely corked.

There are various methods of preparing a solution of coffee. Some authors recommend an infusion, others a decoction, as the best; but almost all concur in recommending the following essential requisites: namely, that the coffee should be good, properly roasted, and finely ground. From the experiments of Mr. Donovan, it appears that water extracts, by infusion, the same quantity of matter from coffee, in very fine powder, as

by decoction. But as a fine state of powder is not to be expected in the ordinary management of culinary affairs, a decoction of coffee, ground in the usual way, will be stronger than an infusion; and more or less boiling is generally practised by economical housekeepers. Mr. Donovan recommends the following method as efficacious in preserving both the aroma and bitter quality of the coffee. The whole water to be used is to be divided into two parts. One part cold is to be poured upon the coffee, and merely brought to a boiling point, when the liquid, being allowed to settle a little, is to be poured off. The remaining half of the water, at a boiling temperature, is then to be poured upon the grounds, and kept boiling for about three minutes, and after a few moments' subsidence the clear part is to be poured off, and mixed with the former liquor. The object in this method is, first, to extract, by a kind of infusion, the aroma of the coffee, by bringing the liquid to the boiling point, and second, to extract the latter properly by decoction. This plan is apparently founded on correct principle; but as most housewives would consider it troublesome to conduct the double process, the ordinary method, if carefully managed, may, in general, answer the purpose. The coffee-pot should be deep, so that any portion of the aromatic principle, which is volatilised by the heat, may be condensed in the cooler part of the vessel at the top, and flow back. The boiling should be made over a slow fire, destitute of smoke, for three or four minutes; or rather it should be a simmering for that period, and two or three grains of very finely cut isinglass, of the most soluble quality, should be added to each ounce of coffee; which will generally be found quite sufficient to clarify the liquid, without filtration or any similar process.

Various proportions of coffee and water are used by different persons, and in Eastern and Continental countries

it is made much stronger than in England. The proportions which Mr. Donovan recommends are at least two ounces and a half of coffee to an imperial quart of water.

ADULTERATIONS. Ground coffee is extensively adulterated with chicory, and more rarely with roasted corn. Chicory is detected by shaking the suspected article with cold water, in a glass vessel; if the coffee be pure it will swim and give little or no colour to the liquid, but if chicory be present it sinks to the bottom, and communicates a pretty deep red tint to the water. Roasted corn may be detected by adding tincture of iodine to a cold decoction of the suspected coffee, which will produce a blue colour in the liquid.

USES. The use of coffee was violently opposed by many persons, on its first introduction into Britain; and even at one period, in some Eastern countries, coffee-houses were suppressed. In the reign of Charles II., coffee-houses were shut up by a proclamation, issued in 1675; but it appears that this arose more from an apprehension of such places "nourishing" sedition, than because the beverage itself was injurious to the health. Coffee, however, when used to excess, is stated by some respectable authors to produce a feverish heat, anxiety, palpitations, trembling, weakness of sight, and a predisposition to apoplexy. In this country it is more rarely used to excess than by some Eastern nations; and the latter do not qualify it with sugar or cream, but perfume it with cloves, cinnamon, or essence of amber. It is highly probable that an excessive use of coffee is injurious to the health; as well from its strength and quantity, as simply from excess of liquid, more particularly if it be very saccharine; but certainly a moderate indulgence in this beverage is productive of no bad consequences. It causes a slight acceleration of the pulse, exhilaration, and

watchfulness, and on account of this latter property it is frequently used by opium-eaters. It is named *la boisson intellectuelle*, and it is said that many men of genius have been partly inspired by its influence, while hypochondriacs find it a solace for their imaginary troubles. Coffee, without sugar and cream, contains very little nutritious matter; for though one of its constituents is a fixed oil, extremely little of this can be dissolved by the water. Coffee has been employed for the cure of ague, diarrhœa, &c., and a strong infusion, without sugar or cream, has been recommended as a palliative in a fit of asthma. Various substitutes have been used for coffee, such as roasted rye, peas, beans, and acorns, the last mentioned substance being generally considered the best. Chicory root roasted is also sometimes substituted for coffee; but it is too bitter to be used alone, although, when mixed with coffee, in the proportion of a sixth or eighth part, it is considered by some to be an improvement. *Essence of coffee* seems to be a fluid extract, and is inferior in flavour; but useful in cases of emergency, or where there is no proper culinary vessel.

CHAPTER IX.

CONDIMENTS.

The use of condiments is very ancient, and common salt, the simplest and the best, has been employed as such from time immemorial. Some authors include in the list of condiments some alimentary bodies, such as oil, butter, sugar, &c.; but there is no reason to believe that the presence of these in the stomach facilitates the digestion of other alimentary substances. Condiments seem

to act upon two principles in promoting digestion. It was formerly explained that, when a sufficient quantity of gastric juice was not formed, the alimentary matters in the stomach remained more or less undigested, and hence uneasy feelings were liable to occur. Stimulating substances, such as common salt, pepper, mustard, &c., excite the inner surface of the stomach, and increase the secretions which are naturally formed by it, and thus an additional supply of gastric juice will be thrown into this organ, so as to counterbalance its deficiency in natural vigour.

It is also probable that some condiments, such as common salt, acetic acid, the aromatics, as pimento, cloves, hops, &c., may prevent the fermentation of alimentary substances in the stomach, on the principle by which they act in preserving food from decomposition out of the body. For there can be little doubt, that when the gastric juice is deficient in quantity or deranged in quality, many fermentable substances undergo a similar process in the stomach, to what occurs under the same favourable circumstances of temperature, &c., in other situations. Condiments are thus useful in derangements of the digestive organs, where the gastric juice is either deficient in quantity or quality, as well as in healthy individuals, when an extra quantity of food has been taken. Like all other stimulants, however, they are liable to be abused, and when this abuse is regularly practised, in weakness of the digestive organs, great and permanent injury is the result. On the other hand, when used moderately they are not only agreeable, but perfectly consistent with the preservation of good health.

GINGER.

Zingiber Officinale.—*Scitamineæ.*—The Ginger Tribe.—The ginger plant is generally believed to be a native

of the East Indies and of several Eastern countries. It was known in London about the year 1566, and is a stove plant in this country; but is extensively cultivated in many of the West India islands, and in America. The whole herb is smooth, the stems annual, herbaceous, upright, wand-like, and about three feet in height. The root is perennial, tuberculous, sending off long fibres, generally white, but sometimes blackish and fibrous internally. The roots are dug up when the stalks are wholly withered, which generally occurs in January or February. After they are picked and cleaned, they are scalded with boiling water and dried with the heat of the sun. This process is only applied to the black or dark-coloured variety of root; for the white ginger is simply washed, scraped, and dried in the sun. Dark-coloured ginger is bleached with a solution of the chloride of lime, and also by the fumes of burning sulphur; but the central portions of the root are not whitened by either of these processes. Jamaica ginger is generally superior to the other varieties imported into Great Britain, and the root is long, smooth, plump, very fibrous when broken, of a white colour with a slight tint of yellow, and possessing much pungency and a pleasant aroma. East India ginger is generally dark-coloured and very inferior in quality. Ginger-root contains, according to Morin, a pale yellow-coloured volatile oil, having the odour of ginger, an acrid and aromatic resin, extract, gum, a considerable quantity of starch, woody fibre, saline matter, water, &c. The active ingredients seem to be the resin and volatile oil, and are the source of the hot, pungent, and aromatic taste of this root.

Uses. Ginger, when moderately used, is an excellent condiment. It is efficacious in dispelling flatulency, and for this purpose it may be either taken in powder or infused in water. It is added to a great number of culinary

and confectionary preparations, by which they are rendered less apt to produce indigestion. It is mixed with drastic medicines to prevent their griping effects on the bowels, or the nausea which they are apt to excite. The root is also extensively employed in the manufacture of ginger beer, ginger cordial, and confectionary articles. The young shoots are frequently used as a preserve, being put into jars along with syrup. They are less pungent than the full grown root, and form a very pleasant and delicate condiment.

PIMENTO OR JAMAICA PEPPER.

Eugenia Pimenta.—Myrtaceæ.—The Myrtle Tribe. —The pimento tree is a native of the West Indies and South America, and grows in the hilly parts of Jamaica, flowering in July. It may also be cultivated in this country, but requires a stove-heat. This tree is an evergreen, and attains the height of about thirty feet. The flowers are small, of a greenish-white colour, and diffuse a most delightful fragrance in the walks where the trees are planted. The fruit is a smooth, shining, succulent berry, of a dark, purple colour when ripe, and contains two kidney-shaped seeds. The tree begins to bear fruit in three years, is mature at seven, and the berries are picked from the branches before they are ripe, or in the green state, as they at this period of their growth contain the most aroma. They are then spread thinly on sheets of cloth and exposed to the sun for many days; being frequently turned during this period. In commerce, pimento is found in the form of round, roughish, brownish-coloured berries, which have an aromatic agreeable odour, resembling a mixture of cloves, cinnamon, and nutmegs (hence its name, *all-spice*), with the pungent slightly bitterish taste of the first of these substances. The small fragrant

berries are considered the best. Pimento contains, according to Bonastre, a green volatile oil, a green soft resin, a concrete oil, tannin and extract, gum, malic and gallic acids, woody fibre and salts. The aromatic pungency of this berry resides chiefly in the rind or cortical part, and seems to be derived chiefly from the volatile oil.

Uses. This is a very useful, safe, and agreeable condiment; being less acrid than white, black, or cayenne pepper, it is better adapted for those cases of indigestion where there is any tenderness about the stomach. It is sometimes mixed advantageously with bitters, in the treatment of digestive derangement; and a watery infusion of it, with the addition of a little sugar and milk, is readily taken by children. It is extensively employed in the process of salting, and seems to possess the property of retarding the fermentation or decomposition of vegetable and animal substances. It is also used in the preparation of preserves and confectionary articles.

CLOVES.

Caryophyllus Aromaticus.—Myrtaceæ.—The Myrtle Tribe.—The clove-tree is a native of the Moluccas, from which it was brought into Europe, by the Portuguese, in 1511. It is now cultivated in almost every part of Asia where the soil and climate are suitable; and also in several of the West India islands, as at St. Vincent, Trinidad, Martinique, &c. It resembles the pear tree, attains the height of from twenty to forty feet, begins to blossom about six, and arives at perfection when twelve years old. The cloves of commerce are the unexpanded flowers, for when fully developed they do not contain so much volatile oil, which is the active constituent. The flowers are gathered by the hand, or are beaten with reeds so as to fall upon a piece of cloth placed

under the tree to receive them, and are afterwards dried by the heat of a fire or by that of the sun. Cloves have the form of a nail, and when good should be large, dense, and brittle, have a reddish-brown colour, an aromatic fragrant odour, a hot, acrid, aromatic, and slightly bitter taste, and when punctured with a pin and pressed, an oily fluid ought to exude. According to Trommsdorff, cloves contain tannin, an insipid resin, gum, extractive, vegetable fibre, water, and about 18 per cent. of volatile oil. The resinous matter has been found capable of crystallisation in needles, and has been named *caryophylline*. The essential oil is obtained by distillation with water, but the process is attended with much difficulty. It is heavier than water, of a very pale reddish-brown colour when new, but becomes darker by age; and its taste is aromatic, hot, and acrid. It is sometimes adulterated with cheaper essential oils, such as oil of turpentine or sassafras, and occasionally with a fixed oil. Its high specific gravity and peculiar taste and odour are the best tests of its purity; but others more difficult of application have been recommended.

Uses. The clove is one of the most esteemed spices, and is a very useful and agreeable condiment. It is used extensively in the preservation of vegetable and animal substances along with salt, acetic acid, sugar, &c., and contributes materially in retarding the process of decomposition. It is also used in the composition of sauces, liquors, perfumery, &c., to communicate an aromatic flavour. The fully formed berries are preserved in sugar and used after dinner to promote digestion. Cloves are useful in dyspepsia by stimulating the digestive organs, and by retarding fermentation in the contents of the stomach. They also have a powerful effect in checking nausea and vomiting, particularly the essential oil. In ordinary cases the oil may be exhibited alone, in the form

of pill made with flour; but in obstinate cases of vomiting, when the bowels are relaxed, its combination with opium is very efficacious, in the proportions of one drop of the oil to half a grain of opium, every two or three hours. In the bowel complaints of children, accompanied with irritability of the stomach, it may often be advantageously combined with chalk mixture, laudanum, sweet spirits of nitre, and a proper proportion of syrup to render it agreeable to the taste. The oil of cloves is also well known as a palliative of toothache, although it sometimes proves inefficacious.

NUTMEG AND MACE.

Myristica Moschata. — Myristiceæ. — The Nutmeg Tribe.—The nutmeg tree is a native of the Moluccas, but is now cultivated in the West India islands. It attains the height of twenty or twenty-five feet, has some resemblance to the pear tree, bears fruit when ten years old, and continues prolific for about a hundred years. Its fruit is pyriform in shape, about the size of a peach, the pericarp or external covering is fleshy and soft, and as it becomes ripe and dry it opens into two longitudinal halves, exposing the nut surrounded by the mace. The nut is oval, its shell is hard, glossy, and of a dark brown colour. The nutmegs of commerce are generally deprived of their shell, have a pale brown colour, furrowed on the outside, and internally are firm, unctuous, greyish, but traversed with red-brown veins, so as to appear beautifully marbled. Mr. Burnet states, that nutmegs should be chosen large, of the shape of an olive, heavy and firm, of a light grey colour on the outside, beautifully striated and reddish within, of a strong fragrant odour, warm aromatic taste, and having an unctuous feel. Nutmegs, according to Bonastre, contain 31.6 of a fixed and butyraceous oil, 6. of a

volatile oil, of a light yellowish colour, having the odour and taste of the nutmeg, small quantities of starchy gum, and a free acid, with about 54 per cent. of vegetable fibre. In order to obtain the essential oil of nutmegs, which is the active constituent, they are sometimes punctured and boiled with water, and the orifices thus made are afterwards filled with powdered sassafras. This fraud is detected by the lightness of the nutmegs, and by discovering the punctures. In commerce a solid oil is sold under the name of oil of mace or Banda soap, which is prepared by beating nutmegs to a paste, inclosing them in a bag, exposing them to the vapour of water, and then expressing the oil between heated plates. This oil is a mixture of the fixed and volatile oils of the nut, and has a yellow colour and an agreeable odour, resembling that of nutmegs.

MACE,—when in the recent state, is fleshy, branching, and has a scarlet colour; but when dried, it is yellowish, brittle, and horny in texture. Its taste and composition are similar to those of the nutmeg.

USES. The nutmeg forms an excellent and very agreeable condiment. It is mixed with numerous culinary preparations, and is frequently employed by invalids whose digestive organs have become weakened. In India, nutmegs are used to a large extent; and in the Moluccas, the natives mix them with all their food, drink, and medicines, and preserve them in salt or sugar.

It is stated by some respectable authors, that nutmegs in large doses, such as two drachms, produce narcotic or poisonous effects; but without attempting to question this statement, it may with confidence be asserted, that they are a perfectly safe stimulant to the digestive organs, when used moderately, or as uniformly practised in this country.

Mace possesses nearly the same properties as the nut-

meg, although less frequently employed; and is very useful in relieving vomiting arising from irritability of the stomach. Twenty grains may be infused in a cupful of boiling water, for twenty minutes, and sweetened with a little sugar; of this, a dessert or table-spoonful, according to the age, may be taken every half hour.

CINNAMON.

Cinnamomum Zeylanicum.—Lauraceæ.—The Cinnamon Tribe.—Cinnamon was known to the ancients, and is mentioned in Exodus as entering into the composition of the sacred oil. The cinnamon tree is a native of Ceylon, but is cultivated in many other parts of the East Indies. It is also reared in the Brazils, Bourbon, the Mauritius, Jamaica, Guiana, Cayenne, &c.; but requires a stove heat in this country. The tree attains the height of from twenty to thirty feet, has a slender trunk, and the wood is light, porous, and used as fuel. The ripe fruit is an oval, bluish-brown berry, studded with spots, about the size of a sloe, having a greenish, slightly acrid pulp, and a taste somewhat resembling that of the juniper-berry. The pulp incloses a nut, and the berries being eaten by crows and pigeons, the seeds are disseminated over a large extent of country; so that this tree is found in the most impenetrable jungles. The tree is cultivated in plantations, and is not expected to yield much bark before it is eight or nine years old. The peeling of the bark commences in May, and continues till the end of October. Mr. Marshall states, that when a peeler perceives a bush with shoots of a proper age for cutting, he tries whether the bark will separate easily from the wood, and when firmly adherent, it is not deemed fit for cutting; and the shoots of branches, the diameter of which is much less than one half inch, or more than two or three inches, are not

cut. The sections of bark which have been removed are carefully put into one another, collected into bundles, and firmly bound together. They are allowed to remain twenty-four hours in this state; a fermentation is thus excited, which facilitates the detachment of the epidermis or outer covering. The cinnamon is then dried by the heat of the sun, collected into bundles of about thirty pounds each, and deposited in the Government magazines. When newly prepared, it has a most delightful odour, and a light orange colour; but the former becomes gradually fainter, and the tint darker, by exposure to the air. Shortly after the cinnamon has been deposited in the store-house, the inspection of it commences, and each bundle is placed on a large bench, while each quill is separately examined. It is divided into three qualities, and the first two are alone considered of sufficient value for the Company's investment.

In Ceylon the best cinnamon has a light yellow colour, is smooth, shining, thin, and capable of being bent to a considerable extent without breaking, having a splintery fracture, and an agreeable warm aromatic taste, with some degree of sweetness. The first two qualities of cinnamon already noticed are packed into bales of about ninety pounds weight, and thus exported; but a considerable quantity of the inferior kinds is also brought into this country. It is dark coloured, dense, woody, having a harsh pungent taste; and is often used for the extraction of the essential oil, or sold by druggists in the form of powder.

It is stated by Mr. Marshall, that cinnamon and cassia are produced by the same tree; but the most recent modern writers consider that they are derived from distinct species. The latter opinion seems to be the correct one; but there is also little doubt, that coarse cinnamon is frequently sold for cassia. The bark of the cinnamon tree, according to Vauquelin, contains volatile oil, which is

the active ingredient, resin, tannin, gum, an acid, and about eighty per cent of woody fibre. The oil is obtained by macerating the bark, coarsely ground, in sea-water, and distilling the whole in a proper apparatus. Eighty pounds of newly prepared cinnamon yield about two and a half ounces of oil, which floats on the surface of the water, and five and a half ounces of a heavy oil, which sinks to the bottom. The oil of commerce is heavier than water, of a reddish yellow colour, having the odour of cinnamon, and a hot, pungent, but sweetish and agreeable taste. When long kept the oil deposits crystals, which have been lately named cinnamic acid.

Uses. Cinnamon is an excellent and agreeable condiment for promoting digestion, and is used very extensively in dietetical and confectionary preparations. When employed medicinally it is considered tonic, slightly astringent, useful in dispelling flatulency and in checking retching or vomiting, and is often mixed with other medicines to cover their disagreeable taste, or to prevent their griping effects on the bowels. The oil is sometimes applied to a carious tooth to relieve a paroxysm of toothache.

Cassia and Cassia Buds—the latter being the dried unripe flower buds, possess properties very similar to those of cinnamon; but are less agreeable and aromatic.

MUSTARD.

Sinapis Nigra et Alba.—Cruciferæ.—The Cabbage Tribe.—The black and white mustard plants are annuals, with yellow flowers, lanceolate and lyrate leaves. They are natives of Europe, and are found in waste fields, banks, and cultivated grounds. They are cultivated in several counties in England, but chiefly in those of Durham and York. The seeds of black mustard

are small, roundish, externally of a reddish or blackish colour, and internally yellow.

The powder has a greenish tint, no odour when dry, but when moistened with water exhales a penetrating and diffusive vapour which is irritating to the eyes. Their taste is acrid, bitter and oleaginous. White mustard seeds are much larger in size, of a yellow colour externally and internally, and possess similar sensible properties, but are not so acrid. According to the modern analysis of black mustard seeds, the constituents are about 28 per cent of a fixed oil, myroxic acid, myrosyne, a fatty matter, gum, sugar, colouring matter, and salts. The volatile oil of mustard, or active ingredient, which is developed when water is mixed with its farina, is supposed to be formed at the moment by the action of this liquid upon the myroxic acid and the myrosyne; and not to exist in it before watery fluids, in some form or another, are added. White mustard seeds contain a crystalline body named sinapisine, analogous to myroxic acid, and a principle similar to emulsin. These, when mixed with water, form a fixed acrid compound, which is similar in its action on the body to the volatile oil of the black mustard seeds. Manufacturers vary in their processes for making mustard. Some extract the fixed oil before it is ground; others allow it to remain; and when the first plan is adopted, the farina is more acrid. In France it is more rarely expressed before grinding, which renders the mustard manufactured there very bland. In this country both the white and black seeds are employed, and frequently flour, cayenne pepper, and ginger are added, with the addition of turmeric as a colouring matter.

Adulterations. The inferior varieties of mustard are often composed, almost entirely, of flour, turmeric, ginger, and cayenne pepper. Turmeric is detected by a solution of potash, soda, or ammonia, which strikes a deep brown

colour when the mustard is diffused in water. Flour is discovered by iodine, which when added to a decoction of mustard, gives it a deep blue colour. When the quantity of flour is large, it forms a tough, elastic mass or paste with water. Dr. Christison states, that mustard for exportation is also adulterated with gypsum.

Uses. Mustard is extensively employed as a condiment, and is very useful as an accompaniment to animal substances difficult of digestion. It causes no injury to the digestive organs, when used moderately; but when there is any tenderness about the stomach, as is often indicated by a red tongue, it should be avoided. Some authors recommend mustard for the table to be made with milk; but it is not well calculated for this purpose, as it becomes rancid in about two days. Water containing common salt in solution will give it the proper consistency, and at the same time ensure its preservation. Mustard is sometimes employed as an emetic, in cases of emergency, in the dose of a small table-spoonful mixed with eight or ten ounces of water. Externally, it is often used, in the form of poultice, to relieve spasms and local pains of various kinds; and if not deep-seated, is generally very efficacious. When long applied to a tender portion of the skin, it may cause blistering; but as the period is generally limited to half an hour, a deep red stain is only produced; which, however, often continues for a number of days.

White Mustard Seeds have been much recommended in weakness of the digestive organs, swallowed in the unground state, in doses of a tea-spoonful. Their action is similar to the mustard in ordinary use, and there is no reason to believe that the moderate combination of the latter with our food would not answer the same purpose.

CAPSICUM.—CAYENNE PEPPER.

Capsicum Annuum. — *Solaneæ.* — THE NIGHTSHADE TRIBE.—The three following species or varieties of capsicum are chiefly cultivated; but several others are described by authors.

1. Guinea pepper, *capsicum annuum*, is an annual, and endures our summer climate. The fruit is a pod, which is sometimes long and sometimes short, or heart-shaped, having a red and yellow colour.

2. Cherry pepper, *capsicum cerasiforme*, is also an annual, and cultivated in the open air during summer. Its fruit resembles the cherry in shape, but is sometimes heart-shaped, and the colour is red or yellow.

3. Bell pepper, *capsicum grossum*, is a biennial, which may be cultivated in the open air during summer, but requires a stove heat in winter and spring. The berries of the capsicum contain a spongy pulp with several seeds; their taste is extremely hot, pungent, and acrid, with scarcely any aroma. According to the analysis of Bucholz, capsicum contains wax, a soft and acrid resin, a bitter extract feebly aromatic, gummy extract, gum, vegetable albumen and vegetable fibre. Braconnot has extracted from the pericarp or external covering of the fruit, an oily or resinous body of a brownish colour, which he has named *capsicine;* the taste of which is at first feebly balsamic, but afterwards insupportably hot and burning, affecting, for a considerable time, the whole cavity of the mouth. When half a grain of this substance is heated in a large room, so that its fumes are diffused through it, sneezing and coughing are excited. Capsicine appears therefore to be the active principle of this fruit, and the pericarp contains nearly two per cent. of it. Bird pepper, and some varieties of the cherry capsicum, are the hottest. The Cayenne pepper of com-

merce, imported generally from the West Indies, consists of the ground pods of various species of capsicum, but chiefly of the bird pepper, mixed with common salt.

Uses. Capsicum is an extremely hot and rather irritating condiment; but when taken moderately, is useful in promoting digestion, and in relieving flatulency. In tropical climates, where the digestive organs are weakened by the excessive heat, it is employed to a much greater extent than in this country, generally, however, fresh from the plant. The green pods grown in this country are also much used, and when preserved with vinegar are named *chillies*.

Cayenne pepper is also used as a medicine in several diseases. It has been employed in typhus fever and narcotic poisoning, to rouse the sinking powers of life; as a gargle in inflammation and ulceration of the throat; and externally, in the form of poultice with loaf bread, to relieve spasms and local pains.

BLACK PEPPER.

Piper Nigrum.—Piperaceæ.—The Pepper Tribe.—Pepper was known to Hippocrates, and Pliny mentions it as a condiment. The pepper vine is a native of the East Indies, and is cultivated in various parts of that country, as well as in the West Indies and in Sumatra. This is a climbing plant, and attains the height of from eight to ten feet. Its fruit is a globular, one-seeded berry, which, when ripe, has a red colour, but is green when young. It is propagated by cuttings or suckers, and requires prop-trees for its proper cultivation. The plant begins to bear about the third year, is considered at perfection at seven, but in three or four years more, it begins to decline. The vines yield two crops annually, namely, in December and July; and as

soon as any of the berries become reddish, the bunch is reckoned fit for gathering, although the remainder are green. After being collected, they are spread upon mats, and dried with the heat of the sun; in consequence of which they become shrivelled and of a black colour.

WHITE PEPPER—is the ripe fruit of the same plant, deprived of its external covering, by soaking in water, drying in the sun, friction, and winnowing.

Black pepper, as found in commerce, is corrugated, has a round shape, a brownish-black colour externally, is hard, whitish internally, and has a hot, pungent taste. White pepper is less acrid and pungent than black pepper. According to Pelletier, black pepper contains an acrid soft resin, a volatile oil having the odour and taste of pepper, extractive, gum, bassorine, starch, acid, salts, woody fibre, and a crystalline body named *piperine*, which is insipid and destitute of odour. The active ingredients of pepper seem to be the acrid resin and volatile oil, with perhaps the piperine, as stated by Dr. Christison.

USES. Pepper is an excellent stimulant for promoting the digestive process, and is so universally employed as to be nearly as indispensable as common salt. It is particularly useful when taken along with vegetables that are liable to produce flatulency; but ought to be employed sparingly by persons who have any tenderness in the region of the stomach. In flatulent cholic, pepper mixed with hot milk is a popular remedy, and is often serviceable. It forms a good external application in cases of local pains, and in spasms of the stomach and bowels. The most convenient and efficacious method of employing pepper for this purpose, is to mix the powder with ardent spirits, dip linen or cotton cloths in the mixture, and apply them to the parts affected; and they should be frequently renewed until relief is obtained.

The crystalline body, *piperine*, already noticed, has lately been recommended for the cure of ague; and some writers consider it superior to quinine, but the statement has not been confirmed by other physicians.

THE CAPER.

Capparis Spinosa.—Capparideæ.—The Caper Tribe.—The caper shrub is a native of the south of Italy, the Grecian islands, and various parts of Asia Minor. It is mentioned by Theophrastus; and has been cultivated in France from time immemorial. It is reared extensively in France and Italy in the open fields, but this country is chiefly supplied from Sicily. The caper bush is about three feet in height, trailing and rambling like the bramble. The flower buds are the parts of the plant chiefly used; but in the south of Italy, the fruit, which is an oval capsule, is also prepared as a pickle; and both have a slightly bitter, acrid, and aromatic taste. Capers are gathered when very young, for they decrease in value as they enlarge in size; and their collection forms a daily occupation for about six months. As they are gathered, they are thrown into a cask, containing salt and vinegar sufficient to cover them. The most green and smallest in size are reckoned the best, and are named *nonpareils*, and the second quality *capucines*. Filings of copper are said to be added to the first pickle, to communicate a green colour to the capers.

Uses. Capers are much esteemed throughout Europe as a pickle, and may be considered a gently stimulating and safe condiment. They are often employed in the preparation of a sauce, which is used with some kinds of animal food and fish. It is considered antiscorbutic, and the bark of the root was formerly in high esteem for removing obstructions. The green fruits of the *nasturtium* or cress are used as a substitute for capers.

MUSHROOMS.

Fungi.—Mushrooms were known to the ancients, are mentioned by Theophrastus and Galen, and Pliny recommends them to be cooked with the stalks of pears, in order to prevent their injurious effects. The same author states that the empress Agrippina poisoned her husband Claudius with this vegetable, and that puff-mushrooms were employed for poisoning the captain of Nero's guard, along with several others. Mushrooms are divided into two classes, namely, the alimentary and the poisonous; and frequent accidents have occurred by the substitution of the one kind for the other. Considerable discrepancy of opinion exists among authors as to the species that are poisonous, for alimentary mushrooms when old, or when they grow on wet ground, sometimes produce deleterious effects. On the other hand, it is known that some nations, such as the Russians, eat all sorts, even those that are considered poisonous in this country; the latter being used, however, to cause intoxication. It also appears that they are subjected to a kind of fermentation, which, very probably, changes or modifies the poisonous principle. Although it is sometimes difficult to distinguish poisonous from alimentary mushrooms, the following characters are generally attached to the first, namely, an offensive or pungent odour, a bitter or astringent taste, a yellow, bright red, or greenish colour, the assumption of a bluish tint soon after being cut, a soft, watery, shining, or leathery consistency, and a warty cap. Esculent mushrooms are generally white, compact, and brittle in texture. Those that are chiefly used as food in this country are the common mushroom or *agaricus campestris;** Scotch bonnets or *agaricus*

* The agaricus campestris contains, according to Vauquelin, adipocire, a thick or oily matter, albumen, sugar, an animal matter like the osmazome of muscle, fungin, salts, &c.

oreades; agaricus deliciosus, which was in high estimation by the Romans; truffle or *tuber cibarium;* morel or *morchella esculenta;* but Dr. Greville enumerates twenty-six species, all abundant in Britain, which may be eaten with safety. The poisonous species of mushrooms have not been correctly ascertained; but those which have most generally caused deleterious or fatal results in this country are the following:—

1. Fly amanita or *amanita muscaria*, which has generally a bright red colour, but sometimes yellowish, greenish, or liver-coloured, having angular warts, and abounding in the woods of the Scottish Highlands.

2. Hemispherical glutinous agaric or *agaricus semiglobatus*. This fungus is abundant in Britain, in elevated pastures, moist meadows, and woods, from May to September. Its stem is pale yellow, hollow, crooked, and glutinous; the usual colour of the cap is pale reddish-orange, or straw coloured, and from half an inch to one and a half inches broad, very smooth and glutinous.

3. Bulbous-stemmed agaric or *agaricus bulbosus*, is abundant in woods, during autumn; its odour is pungent, resembling horse-radish, the cap is two or three inches broad, brown or chesnut-coloured, conical; the stem is about four inches in height, solid, and of a dull red colour. Some of the poisonous mushrooms, according to M. Letellier, contain only one poisonous principle, and others are possessed of two. One of these principles is an acrid and volatile matter, that is dissipated by drying or boiling the plant; but the other resists these processes, has neither smell nor taste, and appears to operate like opium.

The symptoms occasioned by poisonous mushrooms vary according to the kinds which have been eaten. Sometimes they produce narcotic symptoms, resembling

those caused by opium; at other times irritation of the stomach and bowels, accompanied with narcotic effects; but there are most frequently nausea, vomiting, diarrhœa, quick pulse, delirium, stupor, convulsions, &c. When poisonous mushrooms have been swallowed, or even those of an esculent kind which have produced deleterious effects from their indigestibility, emetics ought immediately to be employed, so as to evacuate them from the stomach. The inflammation of the bowels, and injury to the nervous system, must be treated upon general principles.

Uses.—Mushrooms have always been esteemed a very savoury species of aliment, and though, when compared with many other vegetable productions, they do not contain a large proportion of nutriment, yet there is found in their composition a peculiar matter, similar to the osmazome of animal bodies, which, in the opinion of some, gives them advantages as food. Their qualities, as articles of diet, are liable to much variation; for some esculent mushrooms occasionally become deleterious, while several of the poisonous kinds have been eaten with impunity. The causes of these variations have not been correctly ascertained. Some authors state, that drying or cooking destroys the poisonous principles; while others assert that they are safer when raw, or that vinegar and spices correct their unwholesome qualities. Climate, soil, age, &c., modify their properties; thus some species are used in Russia with impunity, which are poisonous in France. The common morel has proved injurious after long continued rain, and the common mushroom is generally believed to be unsafe when old, at which period its white colour becomes dingy. In certain individuals, owing to some peculiarity of constitution, the most wholesome mushrooms cause vomiting, diarrhœa, and colic; and there seems reason to believe that if this vegetable be employed

as a principal part of food for a length of time, it will induce a peculiar depraved state of the body, with a tendency to suppurations and gangrene. It is extremely probable that the discrepancies which exist among authors respecting the esculent mushrooms may be often accounted for, from their indigestibility or extremely slow digestion; thereby causing derangement of the stomach, and violent sympathetic consequences. Dr. Christison states, that portions of them have been discharged by vomiting, so late as fifty-two hours after they were swallowed, from their great indigestibility. Mushrooms in substance should therefore be avoided altogether by those who have digestive derangements. This vegetable is more frequently employed in the cooked than in the raw state; and certainly in the first form is more safe and easily digested. There are various methods of cooking mushrooms, adopted in different countries; such as stewing with oil, butter, animal food, fowls, &c., boiling, roasting, frying, &c.

Mushrooms are also used in the composition of sauces and ragouts, as one of the most savoury ingredients. They may be preserved for future use by drying and grinding, also by pickling with vinegar. In several of the Russian provinces, mushrooms are employed as the principal aliment of the inhabitants, along with coarse bread, during a considerable part of the year; and are eaten with olive oil by the better classes, but with hemp oil by the poor. They are also chopped and cooked with potatoes, turnips, carrots, &c.

In Germany, Italy, and other parts of the continent of Europe, their consumption is much greater than in Britain; and in the central provinces of France they are extensively used, particularly in the dried state, and form a considerable article of commerce.

KETCHUP or CATSUP—is the preserved juice of mushrooms,

and is a preferable preparation to the pickled vegetable. It is made by adding common salt to esculent mushrooms, which causes an exudation of their juices. The salt appears to have a similar effect on them as on animal food; namely, a shrinking of the fibre, and an exudation of a dark-coloured liquor. This liquor is afterwards reduced in bulk by boiling, and seasoned with peppers, mace, ginger, nutmegs, &c.; so that it may be preserved from decomposition.

Ketchup is an excellent and very agreeable condiment, and is employed in the composition of sauces, soups, &c., on account of these valuable qualities. It may be used in moderate quantities by those who have delicate digestive organs, and for such individuals, is greatly superior to rich or butyraceous sauces.

VINEGAR.

Acetic Acid.—Vinegar has been known from a very remote period, and is mentioned by Moses. Indeed, it is highly probable that it was known as early as wine; for the latter, as well as other fermented liquors, is apt to turn acid, or, in other words, to be more or less converted into vinegar. Fermented vinegar is generally made in this country from the malt of barley, by first making an infusion, and then fermenting the latter at a temperature of about 84°. A considerable part of commercial vinegar is now made from wood, by distilling the branches of trees, such as oak, beech, ash, &c. in cast-iron cylinders. The fluid which comes over consists of acetic acid, pyroligneous spirit, and empyreumatic oil or tarry matter. The liquid portion is separated from the solid, and purified by combination with lime, &c. and subsequent distillation. Vinegar or acetic acid, thus prepared, is colourless, free from mucilaginous or saccharine matter, and keeps much better

than that prepared by fermentation; but it does not possess the same agreeable flavour. As it comes from the still, it is generally more concentrated than what is required for culinary use; water is therefore added to reduce it to the requisite strength. Wood vinegar should be colourless, transparent, entirely volatile, and free from any empyreumatic or disagreeable odour. Acetic acid, in its greatest degree of concentration, crystallises in plates at the temperature of about 45°. It contains only a small proportion of water when of this strength, has a very pungent odour, is colourless, very volatile, and has an extremely acid corrosive taste. When applied to the skin, it causes blistering, and is sometimes used for this purpose when a rapid effect is desirable. It dissolves camphor, volatile oils, &c.; and when impregnated with oils of lavender, rosemary, or other odoriferous substances, it is named *aromatic vinegar*, which is much esteemed as a refreshing perfume in cases of fainting, headache, &c. The concentrated acid is also sometimes employed to eradicate warts, corns, &c. It is, however, in the diluted state that it is most generally used for culinary purposes. Wood vinegar, which contains about one-twentieth of real acid, approximates in strength to wine or malt vinegar of specific gravity 1014. French vinegar is superior, in aroma, to all other kinds, and what is imported into this country is called Champagne vinegar, and its density varies from 1014 to 1022. It is distinguished from British vinegars by the purplish precipitate which is thrown down from it, when ammonia is added in slight excess.

Adulteration. Sulphuric acid is employed in the re-distillation of wood vinegar, and when the heat has been too great, a portion of it passes into the receiver. Vinegar may thus be unintentionally contaminated with

sulphuric acid. If it be very minute, it cannot be injurious, and, I believe, is tolerated by the excise laws. When it exists to any extent in vinegar, a solution of nitrate of barytes throws down a copious white precipitate. If copper or lead be present, sulphuretted hydrogen throws down from it a black precipitate.

Uses. Vinegar is employed as a condiment to assist the digestion of fish, or rich animal substances, which are liable to run into putrescence. In general, it agrees with those who have healthy digestive organs; for, when pure, it has no tendency to excite an acid fermentation in the stomach. It differs in this respect from sour beer, porter, and other fermented liquors; for they contain an acid ferment or yeast, which is apt to bring the whole contents of the stomach into a similar state. Vinegar, however, is not a condiment suited to those who are troubled with derangement of the stomach, unless used in very moderate proportions; for almost all acids are apt to excite disagreeable feelings in such individuals. Ordinary vinegar, when diluted with four or five times its bulk of water, is useful as a local application in headaches, sprains, inflammatory swellings, &c.

Pickling.—Purified vinegar, of the ordinary strength, is generally used for pickling or preserving vegetable substances; but it has been found that pyroligneous or wood vinegar, which contains a portion of tarry matter or empyreumatic oil, is best adapted for the preservation of animal substances and fishes. This fact is confirmed by the long-established practice of preserving animal substances and fishes by turf or peat smoke; for, during its combustion, pyroligneous acid is formed. Mr. Ramsay of Glasgow has ascertained that if herrings be simply dipped in pyroligneous acid, of density 1012, and dried in the shade, it is sufficient for their preservation, while their flavour is very agreeable when broiled.

He also showed, by experiment, that beef may be preserved without taint for six or seven months, by an immersion of one minute in pyroligneous acid. In the salting of provisions, the practice of adding a portion of this acid to the pickle, in place of the tedious process of smoking, is now frequently adopted, and is attended with this great advantage, that much less salt is required.

COMMON SALT.

Chloride of Sodium.—This substance exists more abundantly in nature than any other soluble salt. It is found in immense masses, in the bowels of the earth, and is contained in large proportion in sea water. The celebrated salt mines of Poland have been in operation for about five hundred years; but those in Cheshire are more productive than the Cracow mines.

Sea water contains 2.7 per cent of this salt, besides salts of magnesia, potass, and lime (Graham). In Scotland, common salt is manufactured to a considerable extent from sea water, by evaporation in flat-bottomed pans; but in England, a portion of rock or mine salt is mixed with the brine. In warm climates, sea water is evaporated in shallow ponds by the heat of the sun, and the salt thus formed is named bay-salt. In several parts of Germany and France, it is manufactured from salt springs. Common salt is white, generally crystallises in cubes, has a well known taste, commonly called salt, is very soluble in water, but is as soluble in cold as in hot water; when pure, 100 of water dissolve 37 parts of it, at all temperatures. When bitter in taste, or liable to attract much moisture from the atmosphere, it contains bittern or muriate of magnesia, a constituent of sea water, from which it may be freed sufficiently for culinary purposes by calcination.

Uses.—Common salt is the most innocent, as well as

most useful condiment we possess, and appears to be almost essential for the preservation of health. In corroboration of its utility in promoting the digestive process in man, it has been found to produce a beneficial effect on some of the lower animals, by increasing their weight or the quantity of alimentary products which they furnish. According to Liebig, however, the fattening of an animal is rendered impossible, by an excess of salt added to its food, although short of the quantity required to produce a purgative effect. Mr. Park, the traveller, mentions the great value placed upon it in the interior of Africa, and the intense longing experienced by the inhabitants when none can be procured. When taken in large doses it acts as a purgative; but when employed for this purpose, the form of enema is preferred. It is also used externally, in solution, for the cure of sprains and rheumatic pains; and the hot salt-water bath is often very beneficial in chronic rheumatism. It is employed in the manufacture of muriatic acid or spirit of salt, as a glaze for pottery, as a mordant in dying, and in several other processes of the arts. The best qualities for domestic use are bay salt and basket salt; because they are the least liable to absorb moisture from the atmosphere.

SALTED MEAT.—Salt is extensively employed for the preservation of animal food, and in general ensures all the necessary conditions better than any other substance.

The theory of its operation has been differently explained. Some authors have supposed that the salt expels the watery juices of the meat, which have a natural tendency to promote putrefaction, while it excludes, at the same time, the access of atmospheric air. These, no doubt, are operative circumstances, but there is also reason to believe that common salt, as well as many other substances, operate directly as antiseptics; or that they retard or pre-

vent, by their presence, the natural process of decomposition. Muscular fibre, or the flesh of animals, is corrugated and condensed by the application of common salt, and a portion of its watery juices and blood is expelled. It is generally believed that, after the process of salting, particularly when the meat has been kept in the salted state for a long period, a chemical union takes place between the animal fibre and the salt. In proof of which it is alleged, that maceration in water will not deprive over-salted meat of its salt. Mr. Donovan has shown, that over-salted meat, if divided into thin and small pieces, can be thoroughly deprived of its salt, by maceration in water; while if it be macerated in bulk, the interior of the meat undergoes no change. He is of opinion, that over-salting has no remedy; for, when the meat is cut into small pieces, its quality is injured. Salting is also generally considered injurious to the digestibility and nutritive qualities of meat. There can be little doubt regarding the accuracy of the first opinion; for salted meat is harder in texture, and more condensed, than the same substance in the fresh state, and will consequently not be so readily dissolved in the stomach. Mr. Donovan, however, has proved by experiment, that the juices which are usually expelled from meat, during the process of salting, are mere water tinged with blood; there are, therefore, none of its nutritive qualities lost, but on the contrary, it is freed from what would tend to promote putrefaction. All kinds of animal food do not absorb the same quantities of salt, and the fatty portions take up less than the fibrinous parts of meat. From this cause pork is less salt than beef or mutton. According to Mr. Donovan, this is one of the reasons why pork is preferred for sea voyages. The same author is of opinion, that inferior kinds of pork are much improved by a month's salting, being rendered more digestible, wholesome, and palatable; and I have

no doubt that this practice may be applied to other kinds of inferior animal food.

Dietetic Qualities of Salted Meat and Fish.—It has already been stated that the animal fibre is hardened and condensed by the process of salting; and that it is impossible by the ordinary methods of maceration, and subsequent boiling, to remove the salt. These facts will readily account for the more difficult digestibility of salted meat. The fibres will thus be less easily masticated and dissolved in the stomach; and the extra quantity of salt being liable to excite thirst, a tendency to overcharge the stomach with liquids will frequently be induced. Salted meat and fish ought, therefore, to be taken, in small quantities, by those who have delicate digestive organs. Meat or fish, however, which has been slightly salted, only for a few days, is frequently rendered more tender and digestible by this short process. When kept, however, for many months in salt, it often becomes tainted, is liable to prove unwholesome, or to produce scurvy if used without a sufficient quantity of vegetable substances.

CHAPTER X.

COOKERY.

Two principal advantages are obtained by the processes of cookery, namely, the softening of the texture, and some alteration in the chemical properties of alimentary substances. These changes are effected chiefly by the application of heat, which, when properly applied, renders substances that are naturally hard, soft and pulpy, and where little change in the texture is produced, more

wholesome, digestible, and less liable to run into fermentation in the stomach. Dr. Prout remarks, "that animals feeding exclusively on vegetable food, are well known to be furnished with an extensive apparatus of stomachs and other organs, admirably adapted for the purpose of macerating and reducing their refractory food to the purposes of their economy. But man, who is evidently intended to live on vegetable products, in part at least, has not been furnished with this apparatus, and hence we may conclude, that this deficiency was intended to be supplied by his ingenuity, and the artificial processes of cookery. Now the different processes of baking, roasting, boiling, &c., are all of a reducing character, and by their united effects the most refractory substances, even the woody fibre itself, may be reduced to the state of a wholesome and nutritious bread." The same author considers the French cookery superior, in some respects, to that of this country. In France many substances are exposed, through the medium of oil or butter, to a temperature of at least 600° by the operation of frying or some analogous process. They are then introduced into a macerating vessel, with a little water, and kept for several hours at a temperature far below the boiling point, not perhaps higher than 180°; and by these united processes properly conducted, the most refractory articles, whether of animal or vegetable origin, are reduced more or less to the state of pulp, and well adapted for solution in the gastric juice. The cookery of this and many other countries is a very complicated art, and numerous, varied, and absurd are the processes which have been invented. Many of these are devised with no regard to chemical rule; and are rather calculated to render food more difficult of digestion, than to facilitate this function. All the ordinary methods of cookery may be included in the following list; namely, roasting, broiling, frying, baking, stewing, and boiling.

ROASTING—appears to be, upon the whole, the simplest and best method of cooking the flesh of animals. In this process, much of its water is evaporated, and a considerable portion of the fat is liquefied, and runs off. The meat thus acquires new sensible properties, but, according to Liebig, is not altered in chemical composition. The free escape of the water in the form of vapour is necessary for the complete success of the process; hence a sudden charring of the outside, by the application of a too powerful heat, will close the pores, and thus prevent its evaporation. From not attending to this rule of gradually applying the heat, cooks frequently produce an article which has all the external characters of a good roast, and yet in the centre it is raw and unpalatable. A too sudden or a too great evaporation of the water is also injurious; for the meat will thus run great hazard of being burned from the elevation of temperature. This is prevented by the ordinary method of occasionally lifting the liquid fat and pouring it over the meat. When properly roasted, meat ought to be soft, tender, and should possess a sapid flavour. When over-roasted it is liable to become glutinous; and this state indicates the loss of its rich and nutritive juices, and its conversion into a substance resembling gelatine. Roasted are generally considered more nutritious than boiled meats; for in the first, the principal loss sustained by the cooking is fat and some odorous matter, with a portion of water; while in the latter, more or less of the soluble matter is contained in the infusion. In regard to digestibility, the preference is also generally given to roasted meat; but this opinion is perhaps a little exaggerated, for when properly cooked, boiled meat will be found nearly equal to the other in this respect. The external surface of roasted meat is generally hard and often somewhat charred, exhaling a peculiar odour and possessing a slightly bitterish

taste; which qualities indicate the formation of an empyreumatic oil. It is therefore justly considered more indigestible than the other parts, and is more rarely eaten; although there are some persons who like its flavour and use it with impunity. Those troubled with indigestion should, however, avoid it, as well as the rich sauce generally associated with roasts; and a cold roast will be found to agree better with the dyspeptic than when warm or newly done.

BROILING.—This is a process analogous to roasting, but there are some points of difference between them. In roasting, the heat applied is more moderate, and is slow in penetrating; but in broiling it is brisk and rapid, so that the outer surface of the meat is suddenly browned, and the evaporation of the water in the central parts to a great extent prevented. Meat thus prepared has more sapidity, and a flavour different from roasted meat, but is reckoned equally nutritive and digestible. Beef steak, which is a favourite dish with many, is generally cooked in this manner, and if properly done, is exceedingly tender and agreeable; but when eaten in the half-raw state, very difficult of digestion. Dr. Prout remarks that "when the reducing powers of the stomach are weak, a hard and crude English diet, such as half-raw beef steaks, &c., so frequently recommended, are sure to disagree, and produce much discomfort, by promoting acidity, and all its consequences."

FRYING—is the cookery of meat in contact with a fatty body, such as butter or oil; in consequence of which it acquires a slightly empyreumatic odour, from the partial decomposition of the fat. A portion of water is often added, but when present in any considerable quantity, it hinders the operation. It is not so frequently practised as the two preceding operations, and is by no means well adapted for the dyspeptic; for meat dressed in this

manner is often rendered hard, and its oily and empyreumatic impregnation alone renders it very indigestible.

BAKING AND STEWING.—In these processes, meat is cooked in a manner somewhat intermediate between boiling and roasting; being partly boiled in the water which is associated with it, and partly roasted by the hot air of the oven. The flavour of baked and stewed meats is peculiar, rich, and agreeable, but they are not so digestible as roasts, being generally more impregnated with fat.

BOILING.—Flesh or muscle consists chiefly of fibrin, gelatine, albumen, osmazome, the coagulable principles of the blood, associated generally with more or less fat. When meat is boiled in water, the gelatine and osmazome are dissolved, but the albumen is coagulated, and remains in union with the fibrin; while the fat is, to a greater or less extent, melted by the heat, and is found on the surface of the watery fluid. According to Liebig, boiling does not alter the composition of animal food. Mr. Donovan states, that "in order to boil meat to perfection, care must be taken that the heat shall not permeate it too rapidly; for heat, too quickly supplied, would render the muscular fibre at the outside parts tough, while this portion, being now a much worse conductor of heat, would suffer still more, and would not transmit heat so readily to the interior; hence the central parts might perhaps be too raw, while the exterior would be overdone, sodden, and its flavour extracted to waste by the water. Hence slow boiling affords the most wholesome, as well as the most palatable meat. It is best, if boiled in much water, replaced by other hot water as fast as it evaporates." The same author mentions, as a general rule, that each pound of meat will require boiling for twenty minutes; a longer period is, however, often required, and it ought to be

observed that over-boiling, in place of softening, renders the fibre of meat hard. When common salt is added to the water in which meat is boiled, the fibre is a little hardened, but a small portion improves its sapidity. Boiled has less flavour than roasted meat, because in the first the osmazome or flavouring principle is dissolved in the water along with the gelatine; but when juicy, tender, and not too fat, it is savoury and very digestible. In the cooking of vegetables, they ought, as a general rule, to be boiled until they become soft, pulpy, or farinaceous, according to the kind or variety. Half raw or hard vegetables are exceedingly indigestible, and very liable to produce acidity.

Soups.—The nutritive principles of meat which are dissolved during the process of soup-making, are the gelatine and osmazome, or flavouring ingredient; but if the boiling be continued for a long period, a portion of the fibrin, tendons, ligaments, cartilage, &c. is also taken up by the water; while the albumen, along with the fat, collects on the surface in the form of a scum. Water extracts from hashed meat about seventeen per cent. of its weight. Mr. Donovan disapproves of long-continued boiling, as tending to deteriorate the flavour of the liquor, and is of opinion that half an hour is a sufficient time, provided the meat be divided into pieces about the size of hazel-nuts. Soups, when properly made, are very agreeable and nutritive, as well as digestible with most individuals. When rich or fat, and much concentrated, more especially if green vegetables be a constituent, they become the most indigestible of all alimentary preparations. Those who are troubled with derangement of the stomach, should avoid every kind of soup, but the most simple; such as beef-tea, chicken-soup, &c. containing rice, sago, arrow-root, the ripe pea, &c., accompanied with some of the various condiments.

Loss of Weight in Roasting and Boiling.—Mr. Donovan has made some important experiments on this subject, and his results are the following:—

IN ROASTING.

	Loss per cent.
Sirloin of beef,	19⅓
Leg and shoulder of mutton,	24⅘
Fore-quarter of lamb,	22⅓
Geese,	19½
Turkeys,	20½
Ducks,	27⅛
Chickens,	14⅗

IN BOILING.

Legs of mutton,	10
Hams,	12½
Salt beef,	15
Salt pork,	13½
Bacon,	6½
Knuckles of veal,	8⅓
Turkeys,	16
Chickens,	13½

PART II.—ALIMENTS.

NATURAL HISTORY—COMPOSITION—PROPERTIES—ADULTERATIONS AND USES OF ALIMENTARY VEGETABLES—ANIMALS—BIRDS—REPTILES—FISHES, ETC., WITH AN ACCOUNT OF THEIR VARIOUS PRODUCTS.

VEGETABLES.

WHEAT.

Triticum Vulgare.—Gramineæ.—THE GRASS TRIBE.—The native country of this grain is unknown, but it is supposed to be indigenous in the hilly parts of Asia, and to have been rendered hardy by time and cultivation in the more temperate regions of the world. Mr. Burnett states, that wheat will seldom form an ear, under the equator, below the elevation of 4,500 feet, or ripen above that of 10,800; and that it will not vegetate beyond the 62° of northern latitude. There are two varieties of this plant, the *triticum hybernum*, and *triticum æstivum;* so named because they are respectively sown in autumn and spring. Many counties of England are distinguished for the quantity as well as the quality of this grain, such as Kent, Essex, Suffolk, &c., and in Scotland it attains equal perfection in some of the Lothian districts. In the northern parts of this island, it is inferior in quality, dark-coloured, and yields comparatively little flower. In the best wheat countries, and in good years, the weight of a bushel of wheat is said to be about sixty-two pounds. According to Vauquelin, French wheat contains water 10.0, gluten 10.96, starch 71.49, sugar 4.72, gum 3.32.

Wheat, therefore, contains nearly ninety per cent. of nutritive matter, the gluten being the most nutritive of all the constituents, having some analogy to animal substances. It is most abundant in wheat of southern growth. Dr. Christison found 12 or 13 per cent of gluten in the fine qualities of Edinburgh flour. Odessa wheat contains a larger proportion of sugar than wheat of French growth. Bakers judge of the quality of the flour by the manner in which the paste may be elongated; as this depends more or less on the contained quantity of gluten.

BRAN—is the exterior envelop of the grain, exists in the proportion of from 1.2 to 2.3 per cent, and is used chiefly as food for horses; although occasionally employed as a constituent of bread. A decoction of it, used for a length of time, produces a laxative state of the bowels.

ADULTERATIONS. Wheat flour is sometimes adulterated with sulphate of lime or *stucco*, carbonate of lime or *chalk*, potato-starch, and moisture. The salts of lime may be detected by incinerating the flour; and according to Dr. Christison, if it loses more than 12 per cent of its weight, when heated over the vapour-bath, it contains too much water.

Potato-starch is detected, according to the same author, by kneading the flour with a thin stream of water, over a cloth filter, allowing the starch to subside in the filtered water, triturating the lower stratum with water in a mortar, and testing this with iodine, which strikes a blue colour if potato-starch be present, and merely a yellow or red colour if the flour be pure. The grains of potato-starch may be detected by a magnifier, glistening like minute globules of mercury.

BREAD.—The manufacture of good bread is a very nice process, and no doubt has attained its present perfection by very gradual and successive improvements. The grain is first dried in a kiln, then ground and sifted

by a cylindrical sieve into three different qualities. The qualities and nutritive properties of bread depend not only upon the nature of the wheat itself, but also upon the variety of flour used in its manufacture. The best bread is made from the first quality of flour, and coarse or brown bread, from the second or third kind.

Bran bread is made from the *whole meal*, as it is sometimes named, or the product of the first grinding, without the separation of the bran, or the coarse from the fine flour.

The most important discovery in the manufacture of bread was its impregnation with a fermenting principle, by which it is rendered light and porous. This method has been known for a long period; for the use of leavened bread is recorded in the sacred writings. The fermentation of bread was, for a long period, believed to be of a peculiar nature, and was designated by the term panary fermentation. It has, however, been completely established by the researches of modern chemists, particularly by Dr. Colquhoun of Glasgow, that it is the very same process that takes place in a bottle of fermenting beer; for alcohol or spirit can be procured from dough, if the fermentation be allowed to proceed to a sufficient extent. The ancient and some modern nations used leaven, or a portion of a previous *batch*, for the purpose of inducing the panary fermentation; while the bakers in this and other civilised countries generally use yeast. The principle of this practice consists in mixing with the constitution of the bread a gaseous body, or carbonic acid gas, which penetrates into the texture of the dough, and in this manner separates the particles from one another.

By this means the bread is rendered light, porous, elastic, agreeable to the palate, and very digestible. Well manufactured bread ought to be so elastic, that, though forcibly squeezed into nearly half its bulk, it should re-

sume in a minute or two its former size and appearance. It is also a characteristic of good bread, that when soaked in hot water, it immediately softens, swells, and is capable of easy diffusion through the liquid. On the other hand, if a piece of ill fermented or "unpiled bread" be squeezed between the fingers, it retains the form given to it, and when put into hot water, never softens farther than to become a permanently tough mass of dough. Mr. Donovan states, that the quantity of water which flour absorbs in its conversion into bread, varies according to the quality and age of the flour. The better and older the flour, the more water it absorbs to make the dough, and the more it retains after baking. In general, however, good bread retains about one-third of its weight of water, after removal from the oven. This portion of water is somewhat lessened when the bread is exposed to the air for some days, but the greater part is permanently united with it. When bad or spoiled flour is employed in the manufacture of bread, a portion of lactic acid is generated during the fermentation; and the same state is apt to be produced by sour yeast, or by allowing the process to continue too long, before the *sponge*, or imperfect dough, is mixed with the requisite portion of flour, and transferred to the oven. Good practical bakers are very careful in attending to these essential points. When the dough has become sour, the bicarbonate of soda is sometimes added to correct the acidity. This salt, however, when added in considerable quantity to flour, gives the bread a yellowish tint; and this may frequently be observed in the home-made soda-cakes.

ADULTERATIONS OF BREAD. *Potatoes* are sometimes employed by bakers to mix with the flour, in order to increase their profit. In such cases 14 pounds of potatoes to a sack, or 280 pounds of flour, are said to be the proportions employed; but even this small quantity should

not be tolerated, without an admission of its presence in the bread. This fraud may not, in general, be attended with any bad consequences; yet as potatoes contain much less nutriment than flour in proportion to their weight, and as they are apt to disagree with persons of weak digestion, the practice ought to be considered in no other light than an imposition on the public. When the quantity of potatoes is small in proportion to the flour, or about one of the first to eight or ten of the second, the bread is said to be scarcely distinguishable from that which is genuine. If, however, the proportion of potatoes be large, the bread cracks or crumbles, and when cut, adheres to the knife, and appears clammy. Some bakers add a small quantity of potatoes, with the view of forwarding the fermentation.

Alum is frequently used for the adulteration of bread, which practice is reported to be very common in London, where the excellence of bread is estimated, by many, from its whiteness. The addition of alum to bread improves its appearance, rendering it white and firm, so that it is less apt to crumble when cut with a knife. The smallest quantity of alum that can be employed to produce this effect is from three to four ounces, to a sack of flour weighing 280 pounds. This small quantity of alum in the bread cannot, to any material extent, be hurtful to the constitution, for a quartern loaf, weighing four pounds, will only contain about eighteen or twenty grains of this salt. When, however, eight or ten times this quantity is employed, for the purpose of whitening bread made from damaged or inferior flour, it must prove very injurious, and increase the naturally astringent effects of loaf bread.

The adulteration of bread with alum may be detected in the following way. Take two or three ounces of the suspected bread, and rub it carefully in a mortar with six or

eight ounces of cold distilled water, then filter through paper. Add to the resulting liquid a solution of muriate of barytes; if a copious precipitate ensue, which is insoluable in nitric acid, the presence of alum may be considered as nearly certain. But this may be further confirmed by adding to another portion of the liquid a solution of subcarbonate of potass, which throws down from alum a flocculent precipitate.*

Volatile Salt, or subcarbonate of ammonia, is sometimes employed by bakers for raising their bread; most frequently when the flour employed is sour or spoiled. This salt, by the heat of the oven, escapes in the form of gas, and causes the stiff dough to swell up into bubbles. The bread is thus rendered light, and contains numerous and very minute pores; while regularly fermented bread has more of a spongy or vesicular character. A minute portion of the salt adheres tenaciously to the bread; for though it possesses no odour when cold, yet if again exposed to heat, traces of ammonia may be perceived. It is regularly employed in the formation of a peculiar kind of small biscuit, and sometimes in the proportion of half an ounce to one pound of flour.

As this salt is almost wholly dissipated in the oven, and as a minute portion of it would produce no injurious effects, it may be considered a sophistication of minor importance.

Salt of Tartar, or the subcarbonate of potass, is also

* It is not well understood how alum operates in whitening bread; and some have conjectured that it might be owing to the excess of acid which exists in this salt. From some experiments which were made by a baker at my request, free acids do not seem to have any effect of this kind. Eight grains of diluted sulphuric acid were thoroughly incorporated with one pound of fermenting dough, and afterwards treated in the same manner as the other loaves. On examining the bread next day, it proved firm, and a section of it was smooth and not friable; but it was scarcely so white as the other loaves of the same *batch*, and much less so than one into which alum had been put for the sake of comparison. Its taste and smell, however, were similar to the bread manufactured at the same time. Vinegar and chloride of lime were also tried under similar circumstances; but they did not seem to produce any influence on the appearance of the bread.

employed to correct the acidity of spoiled flour; and when the fermentation has been allowed to proceed too far, it is sometimes mixed with the fermenting dough, with the same intention. A small proportion of this salt cannot be productive of any injury to the digestive organs, and certainly it is safer to use the bread with its acid neutralised in this manner, than in its free state; yet with the exception of a general deficiency in the quality of wheat, there should exist no necessity for its adoption.

Blue Vitriol, or sulphate of copper, has been used at Brussels and other places on the continent for the adulteration of bread. It is said to forward the fermentation, render the bread white, more compact, and more retentive of water. It is highly probable that its effects on bread are similar to those of alum, and that it may whiten yellow flour, on the same principle that it bleaches yellow tallow, or dingy cotton and linen cloths; but as it is a very poisonous substance, no conceivable advantage to the baker can justify its adoption. It has not, however, been employed in this country, as far as I am aware.

Carbonate of Magnesia has been recommended by Mr. E. Davy as an excellent substance for neutralising the acidity produced during the fermentation of bad flour, in the proportion of from twenty to forty grains of it to one pound of flour. A small quantity of magnesia cannot be considered an injurious addition to bread; still, in ordinary cases, it ought to be regarded as not essential when there is no failure in the quality of the crops. The odour and taste of bread which contains magnesia are quite agreeable, but when much of this substance is added, its colour is not so white as that of genuine bread. In some cases of indigestion, the combination of bread with magnesia might be productive of advantage; for the magnesia would absorb the acid at the moment of its for-

mation, and thus prevent it from injuring the coats of the stomach, while, at the same time, it might counteract the astringent effects of the flour.

Bicarbonate of Soda and Muriatic Acid are employed by a respectable baker in London for vesiculating bread, which is said to be well raised and otherwise good. In this process, the carbonic acid gas is generated in the dough by the action of the muriatic acid upon the soda; common salt being the result of the combination. An analogous process is employed in some parts of Scotland in making what are termed *soda cakes or scones*, namely, by adding butter-milk and the bicarbonate of soda to flour. Dr. R. D. Thomson notices with approbation this mode of making loaf-bread, and justly considers it more economical, inasmuch as the saccharine matter of the flour is all preserved, whereas, by the process of fermentation, it is to a greater or less extent lost in the form of carbonic acid. It appears to be perfectly adapted for those who have healthy digestive organs; but further experience is required to determine, whether the presence of the saccharine matter may not render it more liable to produce acidity, than common bread, in cases of deranged digestion.

Potato-Starch and other Farinaceous Substances.—Potato-starch, Indian corn, bean meal, pease meal, rye, &c. have all been employed in the adulteration of bread. They are very difficult of detection, and the sensible qualities of the bread are the only indications we possess. When bread contains bean or pease meal, it has a peculiar odour when toasted before a fire, is heavier and less porous, soon dries and cracks. When mixed with much potato-starch, the bread is less sweet, and altogether more insipid, but is white and well vesiculated. Although potatoe starch is not so nutritive as wheat flour, it might, in seasons when the grain crop failed, form a

constituent of good bread, as it is easily manufactured, and, unlike the potato, capable of long preservation. Bread, which contains about one-fourth of potato-starch, is white, wholesome, and agreeable.

Chalk, Stucco, Bone-ashes, are mentioned by authors as occasional adulterations, but these have only been perpetrated in a few extreme cases, and do not here require farther notice.

DIETETIC QUALITIES OF BREAD.—It has been a point frequently agitated, whether fermented or unfermented bread was the most wholesome and digestible. This question may appear to be solved by the almost universal preference given to fermented bread by European nations; at the same time it must be allowed, that the difference between them is not so great as many authors would have us believe. Although fermented bread is generally more agreeable to the palate, better fired, and more capable of thorough mastication, it is possible, with care, to attach almost the whole of these properties to unfermented bread. Besides it is well known, that unfermented bread is generally used by the inhabitants of Asia; and till a recent period the peasantry of Scotland, who are remarkable for their strength and vigour of constitution, employed this exclusively. At the same time, it must be allowed, that fermented bread is better adapted for a refined and luxurious people, in whom the digestive organs have been weakened both by mental and physical excesses. Fermented loaf-bread, when thoroughly manufactured, is very digestible, and generally will agree better with those who have derangements of the stomach than any other form of bread, although slightly astringent, particularly when made from fine flour. It ought not to be used when newly baked, and not until it has been kept for at least twenty-four hours, when it becomes firm and solid in the texture. When used soon after it has been baked, it is liable

to produce acidity, particularly in dyspeptic individuals. It would appear from this fact, that fermentation had not been so completely checked by the heat of the oven as to be incapable of reproduction, after the bread was introduced into the stomach, and exposed to the heat of that organ. Its porosity in a recent state is also not so completely fixed as that of stale bread; and consequently it is more apt to be reconverted into a doughy mass during mastication.

PAN BREAD—although a little more insipid than common bread, is the most easily digested. It is very thoroughly fired, and deprived of moisture, and on this account is more easily disintegrated by water, and maintains its divided state more perfectly after mastication. When this kind of bread cannot be procured by those who have weak digestive organs, ordinary bread, in thin slices, may be toasted, which process should be gradually done.

BROWN OR COARSE BREAD—is made from second or third flour, and is rarely so dry or well fired as fine bread, particularly towards the centre of the loaf. It is sometimes manufactured of very agreeable quality, and is considered less astringent than common bread; but it is less nutritive, and if not carefully toasted less suitable for the dyspeptic.

BRAN BREAD—is or ought to be made from the "whole meal," or the flour which is the result of grinding the entire grain, and without separating the different qualities or removing the bran. When well manufactured in the form of pan-loaf, it is sweet, agreeable, sufficiently dry, and elastic. From containing bran, it is not quite so nutritive as fine bread, in proportion to its weight; but being less astringent, it is well adapted for those who are troubled with indigestion. The flour or meal from which this bread is manufactured, when boiled

with water, or milk and water, to a proper consistency, is well adapted for children affected with derangements of the bowels; for, in such affections, they frequently cannot be persuaded to take arrow-root, sago, or fine flour, cooked in a similar manner.

Biscuit.—This is a species of unfermented bread which contains much less water in its composition than loaf-bread, and hence it is more nutritive in proportion to its weight than the latter. The varieties of this article are very numerous, both in form and composition. The simplest kinds contain only flour, salt, and water; but a large proportion are compounded of sugar, butter, or eggs combined with aromatics. It is impossible to apply any general rule to such nondescript articles of diet; for they may be good, bad, or indifferent, according to the fancy of the baker. A plain water biscuit, well fired, is the most unexceptionable of all the varieties; but a small portion of sugar and butter improves the taste and friability, and is not hurtful to persons possessed of sound digestive organs. Biscuits ought to be thoroughly fired, not hard or tough, but friable, and easily reduced to small fragments, during mastication. They do not agree so well with the dyspeptic as fermented loaf-bread, being liable, in some cases, to produce a feeling of weight in the region of the stomach; but there are exceptions to this rule. Plain biscuit, highly fired, or browned by the application of heat, reduced to powder, and boiled with water, is a very suitable diet for children affected with derangement of the bowels. Biscuits are sometimes fermented like bread; and this would in many cases improve their digestibility.

Semolina or Mannacroup.—Dr. Willich states, that "in 1680 a patent was granted to Mr. Jacob Levy, for a method of making semolina, which previously had been imported from Poland, where it is called Cracow-groats.

It consists in grinding wheat in an appropriate mill, after which the flour is separated from the middlings; the latter are then dressed four different times, in a bolting-mill, and sifted through parchment sieves, till they are perfectly cleared from bran."

Semolina is generally imported from the Baltic, and in Russia it is said to be manufactured from buck-wheat. It has a granular form like some kinds of oat meal, a dingy white colour, a farinaceous somewhat insipid taste, and is well adapted for the diet of children when affected with derangement of the bowels.

BARLEY.

Hordeum Vulgare.—Graminea.—THE GRASS TRIBE.—This grain was known to the ancients, and is mentioned in Exodus. It is an annual plant, has been found wild in Sicily and Russia, is generally cultivated in northern countries, and will grow in a climate where wheat would arrive at little perfection. It is generally considered a very valuable grain, and only inferior to wheat. According to Einhof, the ripe grain contains water 11.20, envelop or bran 18.75, farina 70.05. 100 parts of the farina contain starch with a little gluten 67.18, gluten 3.52, sugar 5.21, gum 4.62, water 9.37, with albumen, vegetable fibre, and a little volatile oil. Proust mentions another constituent, namely, a yellow pulverulent substance, which he calls *hordeine;* but which Raspail denominates bran.

PEARL BARLEY—is made from the species named *hordeum distichon*, or two-rowed barley. The grain is first dried in a kiln, then deprived of its covering or bran by a mill, and finally receives its round shape by trituration.

USES. Barley, though very nutritious, does not form such agreeable bread as wheat, and it is generally dark-coloured. It does not undergo regular vesiculation, from the small quantity of gluten it contains, and is often

doughy in texture. It is liable to produce acidity of stomach when the digestive organs are weak, but is not so astringent as wheat, although less nutritive, and on the whole inferior to this grain as an article of diet. A few years ago it was much used by the peasantry of Scotland, being mixed with pease-meal, which considerably improved the qualities and taste of the bread. Mr. Donovan states, that "bere bread" is common among the Irish peasantry, and its colour is almost black. Barley bread was so little esteemed by the Romans, that their generals used to punish the soldiers who behaved with cowardice, by giving them barley instead of wheat. It must, however, have been considered very nutritive, for the gladiators were named *hordearii*, because barley constituted a large portion of their food. This grain, in the form of pearl barley, is used very frequently in the formation of soups, and it generally constitutes, in Scotland, the vegetable basis of what is denominated broth. It is employed very extensively, after its conversion into malt, in the manufacture of ardent spirits and beer. In the time of Hippocrates barley was used medicinally; and the term *ptisan*, is derived from a Greek word which signifies a decoction of barley. A decoction of barley, or barley water, is still employed in the cure of diseases; but the account of it will be found under the article Drinks.

BEER.

Beer—is a very ancient beverage, and believed by some authors to have been discovered in Egypt soon after the flood. Tacitus states, that the ancient Germans prepared a liquor from barley or wheat, and that they were accustomed to drink it at all hours of the day. Yeast and malt were also known in these days; it is therefore probable that their process of making beer or zythum

was similar to the one at present practised. After agriculture was introduced into Britain by the Romans, beer became the common drink of the country as it long had been on the Continent; but in the reign of Edgar the Saxons of Britain were so addicted to its use, that he ordered marks to be made on their cups, at a certain height, beyond which they were forbidden to fill, under a severe penalty. Hops, however, were not employed in the brewing of ale, in England, until about the reign of Henry VIII.; after which its quality was greatly improved. It is probable that other bitter substances had been used for the preservation of ale before hops were introduced. Mr. Beckman states, that "the Danes brought into this country a mode of brewing beer from the flowering tops of some species of heath; and so late as the 15th century, *myrica gale*, or sweet gale, was used for that purpose." The term beer includes both ale and porter, which are generally named malt liquors, because malt is always used in their preparation. In the process of malting, the barley is first macerated in water, for two or three days, until it swells; after which it is spread upon a floor to about the depth of two feet. It spontaneously heats and begins to germinate; after which it is spread thinner on the floor, and for two days is turned over in order to stop this process. It is finally collected into a heap, allowed to become sensibly hot, and afterwards dried in a kiln. Barley loses by malting about twenty per cent. of its weight; but much saccharine matter is generated during the germination, which renders the grain better adapted for fermentation, and also for furnishing a more agreeable liquor. In the manufacture of malt liquors, the ground malt is infused in hot water, the process being named *mashing*, and the resulting infusion *sweet-wort*. The infusion of malt is boiled with hops, and afterwards transferred to shallow

vessels, where it is allowed to ferment with the addition of yeast.

ALE—is brewed from pale malt, or malt which has not been charred during the process of drying, is syrupy, mucilaginous, and contains more spirit and less hops than porter.

PORTER—is generally made from a mixture of pale and brown malt. Brown malt, being partially charred, is used chiefly on account of its colouring matter, and it does not therefore afford such a strong infusion as pale malt. When a very dark liquor is required, some artificial colouring matter is generally added.

SMALL BEER—is generally made from the wort which is drawn off after the ale or porter infusion has been extracted, and it contains no hops.

These different fermented liquors are frequently much sophisticated. They ought, by law, to contain malt and hops only; but many drugs, some of which are deleterious, are added by the brewer. Quassia, on account of its bitter qualities, is added instead of hops; and in order to disguise this wood, it is kept in the roasted state. The frothy head of porter, which is much esteemed by many, is artificially produced by molasses and green vitriol or sulphate of iron. Capsicum and grains of paradise are employed to give pungency to weak or insipid beer. Ginger root, coriander seeds, and orange peel, are used to give flavour to ale. Honey, extract of liquorice, hartshorn shavings, &c., communicate colour and consistency. Sulphuric acid is added to beer to make it hard, or to bring it forward; and this is intended as a substitute for age, for a portion of acid is always generated in old porter or ale. The intoxicating qualities of beer are sometimes increased by the addition of powerful and dangerous narcotics, such as cocculus indicus, nux vomica, opium, tobacco, &c. At one period, when age was reckoned essential to porter, the tavern-

keepers could manufacture this liquor so as to resemble that of any required age, by combining a fresh with a sour liquid. The public taste is now somewhat altered, and hard beer is generally avoided. Mr. Donovan states that good porter should be transparent, have a light brown colour, be moderately bitter, with a mixture of sweetness, a certain sharpness, but without acidity, and have a close creamy head, which instantly closes when blown aside. According to Mr. Brande, the different kinds of beer contain the following proportions of alcohol, or spirit of wine, in 100 parts:

Burton ale,	8.88
Edinburgh ale,	6.2
London porter (average),	4.2
London small beer (average),	1.28

According to Dr. Christison, Edinburgh ale two years in bottle contains 13.40; and London porter four months in bottle 11.91 per cent. by volume of *proof-spirit*.

Mr Accum states that the solid matter in 36 gallons of London porter amounts to 23 pounds.

DIETETIC QUALITIES OF MALT LIQUORS. Ale and porter contain more alimentary matter than wine, and less alcohol; and on this account are generally considered more nutritive. There can be little doubt, that when a large quantity of beer is taken along with the usual alimentary matters, they will afford a greater amount of direct nutriment to the system than wine; yet it is highly probable that they also operate like it, or diluted spirits, in producing corpulency, from the quantity of alcohol in their composition.

Ale contains more alcohol, sugar, and mucilage than porter; on this account, when indulged in too freely, it frequently causes decided intoxication, accompanied with great nausea and depression. Ale should therefore be taken only to a moderate extent, and ought to be avoided by those who are troubled with indigestion, as it is very liable to produce acidity and flatulency. Porter, as it con-

tains less alcohol and extract than ale, is lighter and more digestible, when sound and not sophisticated. From its containing more hops, it is more tonic and better adapted for those who have weak digestive organs; but even porter is often found to disagree with such persons. It may be allowed to convalescents from fever and other acute diseases, if there be no particular derangement of the digestive organs. Small beer is only useful in proportion to its effervescence, or to the proportion of carbonic acid it contains. It is a very agreeable refreshing drink, but, as it does not contain hops, is very liable to occasion acidity and flatulency. In acute diseases, it should only be allowed to a very limited extent; and then only when its quality is superior, namely, brisk, watery, agreeable, and not acid.

COMMON OAT.

Avena Sativa.—Gramineæ.—The Grass Tribe.—The oat, though not indigenous in Scotland, has been so long cultivated there, that it has been characterised as a grain peculiar to that country. It was found by Anson growing wild upon the island of Juan Fernandez; but the place from which it was first brought to Europe has not been ascertained. Several varieties of this grain are cultivated in this country, but its taste is generally agreeable and sweetish, with a very slight degree of bitterness. Vogel has found oats to contain in 100 parts, farina 66, and bran 34, the proportion of husk being large. The farina contains a yellowish-green fixed oil, bitter extract, sugar, gum, coagulated albumen, and starch. Dr. Christison has examined oatmeal, and found 72.8 per cent. of starch, 5.8 of a saccharine extract, 3.2 of albumen, a little resinous matter, 11.3 of bran, and 6.6 of moisture. Oats when freed from their envelops or coverings, are named *grits* or *groats*, are frequently used in making broths and

gruels, and are calculated to furnish a more transparent liquid than oatmeal.

PREPARED GROATS—are the ordinary groats reduced to a fine powder. Oatmeal is generally manufactured in the form of a coarse powder, as the cakes and other preparations which are made from it are thus prevented from assuming a starchy consistence. Oatmeal cakes are much improved by the addition of bicarbonate of soda, which sometimes gives them a yellowish tint, and renders them more friable and digestible.

USES.—This grain is a nutritive and important article of diet, and is generally liked by those who have been early accustomed to its use. It has no tendency, like wheat, to produce an astringent effect on the bowels; and on that account is well adapted for children and persons of sedentary occupations. It is apt, however, when used in considerable quantity, to produce acidity of stomach, particularly in persons of weak digestive organs. Such individuals may often, however, use a small quantity of oatmeal *porridge* in the morning; for in the evening it is more apt to disagree, being liable to occasion disturbed sleep. Oats are considered by many authors as heating to the system, and liable to produce cutaneous eruptions. This is undoubtedly an erroneous statement, and may have arisen from the association of oatmeal and the itch as common accompaniments of the Scotch peasantry at one period.

Oatmeal may be deprived in a great measure of its tendency to produce acidity by maceration in water, and this is an important desideratum for children, who often prefer it to other kinds of farinaceous diet. The quantity of oatmeal intended for use should be well mixed with cold water, and macerated for twenty-four hours; the latter being decanted and renewed two or three times during that period. By this means the water dissolves

the saccharine matter, which appears to be the chief source of the acidity. Some authors have stated, that oatmeal causes concretions in the bowels, from the aggregation of the fibrous matter of this grain; giving rise to dangerous obstructions in these organs. Although there can be no doubt that such occurrences have been met, it must nevertheless be allowed that they are extremely rare.

At one time a kind of beer, named *mum*, was made principally from oats, and *grain whisky* is generally manufactured from a mixture of this grain with barley. A French writer, Nodier, states that "in Scotland, an *eau de vie* is made from oats, which is much used in that country, called *wisky*, that it is mixed with water to make *grog*, and that it renders drinkable the most unwholesome waters."

Sowens.—This preparation is peculiar to Scotland, and is made from the husks of the oat, improperly named "seeds." These are mixed with tepid water, which is frequently stirred for a few days, until it becomes slightly acid; after which the liquid containing the husks and farinaceous powder is strained through a sieve. In this process that portion of the farina or flour of the grain, which adheres to the husk, is separated by the water, and falls to the bottom; and the liquid becomes acid from the fermentation of the sugar which has been dissolved. The effect of the acid thus generated is to whiten or bleach the farina; and when acidification is slow in being developed, those who are knowing in this manufacture add a little butter-milk to quicken the process. The husks sometimes contain too little farina, and in such cases a little oatmeal is added.

Before use, the acid, which appears to be the lactic, should be completely washed away by repeated affusions of cold water; but as much of this liquid ought to be left as will give the farina the proper consistence when boiled.

Sowens being almost solely composed of the amylaceous or starchy principle of the oat, is an exceedingly light and digestible species of food, although slightly insipid. It agrees much better with those who have weak digestive organs than any other form of oatmeal, and is well adapted for persons affected with fevers or inflammatory diseases.

CULTIVATED RYE.

Secale Cereale.—Gramineæ.—The Grass Tribe.—The native country of this grain is unknown, but it has been found growing wild in north America. Mr. Philips supposes it indigenous in Egypt, and quotes in proof a passage from Exodus: "The wheat and rye were not smitten, for they were not grown up." Mr. Pereira assigns its habitat to the Caucasian Caspian desert. It appears to have been cultivated in Britain at a very early period, and then more extensively than at the present day. According to Einhof, this grain is composed of envelop or bran 24.2, farina 65.6, water 10.2. The farina contains, in 100 parts, starch 61.07, gluten 9.48, vegetable albumen 3.28, sugar 3.28, gum 11.09, vegetable fibre 6.38. Rye is capable of being formed into fermented bread, as it contains a sufficient amount of sugar and gluten.

Uses.—Rye bread is dense, of a dark brown colour, has an agreeable sweetish taste, and is very nutritive, from the large proportion of gluten it contains. It is less astringent than wheaten bread; but is liable to produce acidity of stomach, and sometimes diarrhœtic effects. The fermented rye-bread made by some bakers seems to be composed of rye and wheat, with the addition of sugar or molasses. When thus prepared, it is by no means well adapted for those individuals who have been advised to use genuine rye-bread. Rye is used in the manufacture of gin, along with barley-malt and juniper berries.

DISEASED RYE OR ERGOT OF RYE.—This grain is affected, during some peculiar seasons, with a disease which has been named *ergot*, from its resemblance to the spur of a cock. The grains have a black or violet colour, a farinaceous, slightly bitterish, and acrid taste. When reduced to powder they assume a greyish colour; and infused in boiling water, the liquid has a rosaceous tint, accompanied with a peculiar but characteristic odour. Various opinions have been formed respecting the nature of this substance. The most probable theory is that minute fungi excite a diseased growth in the embryo, and that this latter product constitutes the ergot. The circumstances most favourable for its production, are a damp soil and a warm atmosphere. The district of Sologne in France has most frequently been visited with this disease. When the unsound rye amounts to a considerable proportion of the whole produce, and when the inhabitants live principally upon this grain, a peculiar and very fatal disease is induced, called *dry gangrene*. It generally affects the feet, which become black, hard, and dry, like charcoal, complete mortification taking place in the parts. The affection is not produced when the rye contains only a small proportion of vitiated grain, but if there be a fourth part of it present, and if used for several months in succession, gangrene is very liable to occur. These injurious effects of spurred rye have been confirmed by feeding some of the lower animals with it, for a certain time. It is occasionally produced in Britain, but no instances are recorded of its causing any such effects. Ergot of rye has within these few years been much employed to facilitate parturition; and when exhibited with proper precautions, and with attention to certain rules, is a very valuable medicine.

RICE.

Oryza Sativa.—Gramineæ.—The Grass Tribe.—Rice is indigenous in India, where it has been cultivated from the most remote ages. It was cultivated by the Egyptians, Persians, Babylonians, and all the Eastern nations. Theophrastus informs us that the Greeks had obtained this nourishing seed prior to his day, which was three hundred years before Christ; and that it was carried to Italy, forming one of the earliest aliments of the Roman people. It thrives well in low and inundated grounds, and when transplanted from the Continent into America, was found to grow luxuriantly in that country. The state of Carolina has long been known for the superior quality of its rice. In the island of Ceylon, and in most parts of Asia, the cultivators of rice make reservoirs of water for the purpose of irrigating the plant; and the soil is rendered so wet, that their feet are often immersed in the liquid during their labours. The Chinese water their rice-fields by means of moveable mills placed as may be required upon any part of the banks of a river. The water is raised in buckets to the proper height, and afterwards conveyed in channels to the destined places. As the grain ripens, and harvest approaches, the ground is allowed to dry.

The cultivation of rice is a very unhealthy employment, on account of the marshy effluvia that issue from the soil; and the labourers are often observed to be feeble, sometimes bloated or scorbutic. For this reason, in some civilised countries, rice-fields must be removed to a certain distance from towns, that the inhabitants may not suffer from the deleterious emanations arising from them. In the vicinity of the rice-fields in the north of Italy, a disease named *pellagra* is frequent. The rice plant is annual, and somewhat resembles our corn,

but is thicker and more firm than wheat or barley. It generally attains the height of four or five feet, and grows from four to six months, according to the country and the temperature of the climate. When ripe, it is cut in a manner similar to wheat. In some Oriental countries it is put into bundles, and the grain is trodden out by oxen. To free the grain from its envelop or husk, which adheres very tenaciously, it is bruised in a wooden mortar, or passed through a mill. At Japan the rice labourers tread upon it forcibly with their feet, in order to accomplish the same end.

The grain is white, oblong, semi-transparent, hard, has a farinaceous somewhat insipid taste, and is capable of being preserved for a long period. According to Braconnot, Carolina rice contains in 100 parts, fixed oil 0.13, sugar 0.29, gum 0.71, starch 85.07, gluten 3.60, vegetable fibre 4.8, water 5.0, with a small proportion of salts and acids.

Uses. This is perhaps the most important grain cultivated by man, and is used as aliment by a great number of nations. Merat and De Lens state that three-fourths of the inhabitants of the earth are nourished by it, and that, in this point of view, wheat cannot be put in comparison with it. From the small quantity of its contained gluten and sugar, it cannot be formed into fermented bread; and the inhabitants of Oriental countries generally boil it, and add aromatics or condiments to cover its insipidity. Rice contains a large amount, or about ninety per cent. of nutritive matter, or about the same quantity as wheat; but as its proportion of gluten is considerably less than that of the latter grain, it is not so powerful as an alimentary substance. It is, however, sufficiently nutritive in all ordinary cases, very easily digested, and is better adapted for those who have weak digestive organs, with a tendency to acidity, than any

other grain. It is slightly astringent, but this property, in some cases, renders it useful to those whose bowels are liable to become too relaxed. It is also a very suitable diet for persons convalescing from fevers and inflammatory diseases. In this country, rice is rarely used as a principal aliment, but generally as an accessory dish. It might, however, in many cases, be substituted for potatoes and green vegetables, when these are found to disagree. Its insipidity may be completely removed by the addition of salt and some agreeable aromatic, or it may be added to soups in place of other vegetables. Rice is sold under various forms, namely, in the entire state, ground, and reduced to a fine powder, or what is named "flour of rice." All these preparations are very digestible when properly cooked, but the entire grain requires a longer application of the heat than the other two before it is sufficiently pulpy. An amylaceous product is at present manufactured near Paisley from rice, as a substitute for arrow-root. It is beautifully white, and is nearly equal in appearance to the arrow-root from the Bermudas, although scarcely so agreeable to the taste. It is stated by M. de Theis that vermicelli and macaroni are manufactured chiefly from the farina of rice; wheat, however, is the grain from which these preparations are generally understood to be made. Rice is also employed in the arts. Ladies' bonnets, &c. are made from the straw, and a kind of wine or beer is prepared from the grain, named *sakki* at Japan and Samsèe in China. This liquor, when distilled, furnishes the ardent spirit called *arrack*. A decoction of rice is very viscous, and is employed in the preparation of pastes, which are used in various small manufactures.

MAIZE.

Zea Mais.—Gramineæ.—The Grass Tribe.—This

grain is of great antiquity, and is generally believed to have originated in America; although it is frequently known by the names Indian, Turkey, or Guinea corn. Its culture is more extended than that of wheat, and it forms one of the principal aliments of the human race. It is used in the half of Europe, in America, and to a great extent in Asia and Africa. This plant is, however, not capable of cultivation in every quarter of the globe, for it requires a certain continuity of heat, which is not so essential in the rearing of wheat. It is one of the most productive grains, and in this respect greatly surpasses wheat, whilst its envelop or bran is much less. Its varieties are the black, golden, yellow, and white grains; the yellow being the most common, and the white the most delicate in quality, but more difficult of culture. The size and form of the grains also vary considerably, but they have generally a quadrilateral, somewhat compressed shape. The plant sometimes grows to a very gigantic height, and at Guinea and Peru it attains to that of 18 feet. The grains of maize are dried in the sun or in an oven, and afterwards ground in a mill. The farina has a pale yellow colour, is coarser and more spongy than flour, has a peculiar odour, and a slightly bitter taste. According to Gorham, maize contains in 100 parts, starch 77.0, zeine 3.00 (a principle analogous to gluten), albumen 2.5, sugar 1.45, extractive 0.80, gum 1.75, vegetable fibre 3.00, water and salts of lime 9.0.

Uses. From the small quantity and peculiar nature of the gluten or zeine, and the small proportion of sugar which maize contains, it cannot be made into fermented bread without the addition of some other grain. It is therefore seldom used in the form of bread, which is dark-coloured and glutinous. Maize is generally made into a kind of pottage or *bouillie*, called *polenta*, or boiled with milk or water, and seasoned with

salt, sugar, butter, or aromatics. It is also made into thin cakes, various kinds of pastry, and into a species of vermicelli. According to many writers, men who use maize as food are better nourished, stronger, and bear more fatigue than those alimented with rye, barley, or buckwheat. It is used by the poor in the whole of northern Italy, as well as over the whole continent of America; and negroes prefer it to rice, because it renders them more fit for labour.

When the discussion occurred, in the French Academy of Medicine, respecting the dietetic properties of maize, it was reported by the medical officers of the army, that those conscripts are finer men in countries where this grain forms the common aliment of the inhabitants, than in those where it is not used. It is also said to render the men more active, to promote the natural action of the bowels, and cause placid sleep. Many of the lower animals are also well nourished with maize. Chickens, under its use, acquire a fine firm flesh, and an abundant white fat. Pigeons, hogs, horses, mules, &c., are fed upon this grain, and thrive well. It was at one period very celebrated in the cure of epilepsy, and although this opinion is too absurd to require serious refutation at the present day, it may be useful as an alimentary agent, derangement of the digestive organs being frequent in this disease. The unripe straw of maize contains a considerable quantity of saccharine matter; and Humboldt states that the Mexicans extract sugar from it, which is used for culinary purposes. The grains, when boiled in water, furnish a liquor which by fermentation is converted into a kind of beer, from which spirit of wine may be obtained by distillation. Parmentier states that, when roasted, they may be used as a substitute for coffee. In some countries, such as Africa, the unripe grains are eaten, as they contain, at

this period of their growth, a milky juice of a very saccharine nature.

MILLET.

Panicum Italicum.—Gramineæ.—The Grass Tribe.—Millet is an annual plant, and is a native of India, from which Britain is chiefly supplied with this grain. It has, however, been cultivated in all the countries of Europe, Asia, and Africa. Its seeds are small, numerous, shining, yellow, and ovoid in shape, and some of the ears will furnish nearly two ounces. In wheat countries, it is rarely used as the aliment of man; but is sometimes made into bread by the Italians, which is of a yellowish colour, sweetish, but not very pleasant. It is more frequently made into pottage and puddings, which are used by the poor in Italy and Spain; but its chief consumption is in the feeding of poultry. Millet is said to be somewhat astringent and diuretic, and at one period was believed to be of great service in diseases of the lungs. The inhabitants of some countries in Tartary extract an alcoholic liquor from it by fermentation, and also form it into a kind of bread. In former ages, the savage Sarmatians, who overcame the Roman empire, mixed this grain with the blood of horses, as an article of food.

BUCKWHEAT.—SARRAZIN.

Polygonum Fagopyrum.—Polygoneæ.—The Bistort or Buckwheat Tribe.—This annual plant was introduced from Asia into Europe towards the end of the fifteenth century. It is cultivated in almost all the provinces of France, as well as in Russia and Germany, and will grow in soils where wheat and rye would arrive at little perfection. It is therefore a valuable grain for sterile districts. The seeds are about the size of the vetch, have a triangular shape, and the farina, procured by grind-

ing them, is whitish in colour and has a farinaceous taste, not unlike, in some respects, that of barley-meal. According to Zenneck, this grain contains resin, gluten, albumen, extract, gum, starch, and vegetable fibre. The bread formed from it is heavy, and though it contains about 10 per cent of gluten, does not possess the qualities of a well-fermented article. Although not so nutritive as wheat, barley, &c., it still contains a large amount of alimentary substances; namely, about 52 per cent. of starch, besides gluten, gum, sugar, and albumen. It is usually made into thin cakes, pottage, tarts, &c. *Semolina* or mannacroup is sometimes made from buckwheat. The seeds are occasionally used in this country to feed poultry and horses.

SUGAR-CANE.

Saccharum Officinarum.—Gramineæ.—THE GRASS TRIBE. —This valuable vegetable is generally believed to be a native of the East Indies, and was known in Bengal about the year 1250. Though now cultivated to a great extent in the West Indies, it is, according to Dr. Macfadyen, found nowhere in the new world in a state of nature. There are several varieties of this plant, such as the red, the white, and the elephantine sugar cane, and a fertile soil is required for its successful cultivation. The root is jointed, solid, fibrous, and it sends up several erect, round, smooth, leafy and jointed stems, to the height of ten or twelve feet. The leaves are about three inches broad and three or four feet long; but the plant seldom blossoms, being cultivated in a rich soil which causes it to increase much in the root. Mr. Burnett states that the sugar-cane is propagated by cuttings of the stalk, which are planted in rows. The rows are generally four or five feet distant from one another, and more plants are allowed for a poor than a rich soil. Cane plantations are made twice

a year, in May and June, or December and January, these being the rainy seasons. The first cutting of the canes does not take place until a year after they are planted; but an established plantation is cut every six months. In a rich soil, the plants will survive for twenty years, but not more than half that time, if it be inferior. In the West India islands, the canes are generally cut immediately after the autumnal rains. They are then deprived of their leaves, and crushed between iron cylinders, for the expression of the juice, which is conveyed into a large copper vessel. The juice contains sugar, vegetable albumen, an acid, &c.; and if the temperature be high, the albuminous constituent reacts upon the saccharine matter and speedily causes fermentation. It is therefore necessary, as speedily as possible, to free the juice from this substance by lime, which, uniting with it, causes it to collect on the surface in the form of a coherent scum. 1 part of lime, to 800 of cane-juice, are the proportions generally employed; but these are varied according as it is more or less watery. The heat which is applied to the mixture during this process is about 140° F. It is afterwards subjected to three or four different boilings, the scum being frequently and carefully removed, and during the last, lime water, if required, is added. When boiled until it is sufficiently concentrated, it is transferred to a wooden vessel, named the cooler, to crystallise or grain. It is then put into hogsheads, placed over a cistern and having their bottoms pierced with holes that are stopped with cane or the stalk of a plantain leaf. The syrup which has not crystallised filters through these openings into the vessel placed below, for about three weeks, and leaves in the casks what is named raw or muscovado sugar. A gallon of cane-juice is supposed to yield about a pound of raw sugar, which still contains a large portion of molasses; and this is separated from the crystallisable

portion by the process called refining. When raw sugar is kept for a length of time, it becomes weaker in saccharine properties, soft, and gummy. Various processes are adopted in the manufacture of refined sugar. The old process consists of boiling raw sugar with blood and lime, and then purifying the sugar loaves by the application of a stratum of clay, moistened with water, to the broad end of the loaf. The water drains through the pores of the sugar, and carries the molasses along with it, through the opening at the conical termination of the mould. Various improved methods are now adopted; such as boiling with steam, and *in vacuo* by means of an air pump, the use of animal charcoal to destroy colour, and sulphate of zinc, or hydrate of alumina, to precipitate impurities, and the employment of a peculiar kind of filters made of canvass.

Sugar is also manufactured from several other vegetables, such as beet-root, the maple tree, &c.; and may be procured, by chemical means, from substances which do not naturally contain it.

MAPLE SUGAR.—The sap of the sugar maple (*acer saccharinum*) is converted into a useful sugar, in some parts of North America. It has a dirty white or brownish colour, is aggregated into lumps like refined cane sugar, regularly crystallised, and has a very saccharine though slightly peculiar taste. The beet-root yields sugar which is little if at all inferior to cane sugar, and its manufacture is carried on in France, &c., to a considerable extent. A particular species of sugar is manufactured from the juice of the grape, and by the chemical action of sulphuric acid on starch and wood, but the latter is very inferior in saccharine properties.

EXTRACT OF LIQUORICE—is manufactured from liquorice root (*glycyrrhiza glabra*), and contains a large quantity of unfermentable sugar, but which has little sweetening power

when compared with cane sugar. It is, however, efficacious in disguising the taste of certain nauseous medicines, such as senna; and as it is not fermentable it is less liable to disagree with the stomach than cane sugar, when used in the form of syrup for pectoral affections. Sugar is also contained in milk, being the principal source of its agreeable taste.

Uses. Sugar is rarely adulterated, although it sometimes contains a little carbonate of lime, derived from the lime employed in its purification, but this is generally so minute as to produce no injurious effects. It is important, however, that the different qualities of sugar be attended to; for the less molasses it contains, its digestibility is so much the easier. As a general rule, therefore, the dry and light-coloured kinds are preferable to those which are damp and dark in the tint; but refined sugar, regularly crystallised sugar (*sugar-candy*), or the Demerara crystal sugar, ought to be preferred to any other. Sugar is generally considered very nutritive and easy of digestion; the greater part of it, in a healthy individual, being converted into chyle, and thus a small portion only is left as excrementitious. Animals, however, cannot be supported by it alone for any length of time, or without the admixture of some other species of aliment; and in this respect it is analogous to oil and some other substances, as shown by the experiments of M. Majendie. As a proof of its fattening properties, the negroes of the West Indies are generally quoted, who, during the sugar season, are represented to be in a state of *embonpoint*.

Sugar, however, cannot form a large proportion of the food of persons in ordinary life, without some derangement of the digestive process. In cases of dyspepsia, sugar, saccharine fluids and articles of confectionary, &c., containing them, more particularly if molasses be a constituent, are very apt to occasion acidity, flatulency,

and sometimes diarrhœa. Sugar of the finest quality should therefore be alone used by such persons. Sugar is employed in the formation of various syrups, in concealing the taste of unpalatable drugs, and as an antidote to poisoning with the salts of copper, mercury, silver, lead, &c. In the West Indies, molasses is employed extensively in the manufacture of rum; and the peculiar flavour of this ardent spirit is supposed to be owing to an essential oil contained in cane juice. It is a popular opinion that the use of sugar spoils the teeth; but this belief appears to be totally without foundation.

HONEY.*

The Bee—(*apis mellifica*)—a hymenopterous insect, has been well known from the earliest ages, and is referred to in the Old Testament. In the natural state the bee dwells in hollow trees; but at the present day it is domesticated in every country. A swarm or community consists of females, males or drones destitute of stings, and neuters or working bees. The neuters are the most numerous, averaging from fifteen to thirty thousand, and the drones from eight hundred to one thousand. The drones are destroyed by the working-bees about autumn, after their services can be dispensed with.

Honey is collected from the nectaries of flowers by the working-bees, who pass it into their crops or honey-bags, where, probably, it is mixed with some of their secretions, and slightly altered in its properties. It is afterwards deposited or disgorged into the cells of the honeycomb. The species of plant on which the bee feeds influences the quality of the honey very materially. Thyme, lavender, rosemary, and other odoriferous plants,

* Although honey is to a certain extent an animal product, it resembles sugar very intimately in chemical and dietetical properties, and has therefore been described as a variety of this substance.

influence both its odour and taste; and the colour is always brown when the settlement of the bees is in a heathy locality. Honey sometimes becomes poisonous, when collected from poisonous plants. This almost never occurs in this country; but such accidents have taken place in some parts of Asia, and North and South America.

Several varieties of honey are met in commerce. 1. Virgin honey, which flows spontaneously from the comb, and is the most transparent and free of colour. 2. Expressed honey. 3. Honey expressed with the aid of heat. When recently dripped, honey is liquid, transparent, viscid, of a straw colour more or less deep, and has an agreeable aromatic odour and sweet taste. When kept for some weeks, it begins to solidify or crystallise. The crystals should be large and granular, and the substance of the honey when cut ought to be whitish, soft, and contain a rich juice in the interstices of the grains. Honey contains two kinds of sugar, a crystallisable and an uncrystallisable, and inferior varieties contain the largest proportion of the last mentioned kind. It also contains gummy and waxy matters in small proportions. Honey is soluble in water, and partially so in alcohol, is capable of the vinous fermentation, and the beverage named *mead* is made from it. It is also capable of the acetous fermentation; and inferior kinds of honey frequently become acid and give out a disagreeable odour. Inferior honey may be purified by boiling with a third part of its weight of water, and a $\frac{1}{16}$ of ivory black, filtration through flannel, clarifying with white of egg, and then concentrating it to the due consistency over the vapour-bath. (Christison.)

ADULTERATIONS. It is sometimes adulterated with sugar when high in price, and also with flour or starch. These are dissolved in water and added to the honey, in the liquid state. The flour or starch may be detected by

the tincture of iodine which strikes a blue colour if these be present, but it is more difficult to discover sugar. When much sugar is added to honey, the latter soon becomes dry, hard, wants its rich peculiar taste and odour, and the crystals are more regular in form, and not granular like those of genuine quality.

Uses. Honey resembles sugar in alimentary properties, but is more difficult of digestion, and is rather laxative. When taken to a considerable amount, it is apt, particularly in persons of delicate digestive organs, to induce flatulency, spasmodic pains in the bowels, and diarrhœa. It therefore ought to be considered, as is generally the case, more as an agreeable adjuvant to the other alimentary matters, than as a principal constituent of any repast.

Honey has been used in medicine for a long period. It enters into the composition of gargles and diet-drinks, and is employed, in some cases, in place of sugar or syrup.

THE PEA.

Pisum Sativum.—Leguminosæ.—The Pea Tribe.—This annual plant has been cultivated in this country from time immemorial. It was not very common, however, in the reign of Queen Elizabeth; and Fuller states that peas "were fit dainties for ladies, they came so far and cost so dear." It was formerly as much cultivated in Scotland as corn; but since the introduction of the potato, its use has diminished. Numerous varieties of this pulse are cultivated in gardens, which are distinguished by their colour, size, and taste, the latter being sweet, farinaceous, and agreeable. There are only two principal varieties grown in the fields; namely, the grey and the white. According to Braconnot, the pea contains starch 42.58, gluten or legumin 18.4, a gummy substance 8.00, sugar 2.00, pectic acid mixed with starch

4.00, chlorophyl 1.2, amylaceous fibrin 1.06, envelop 8.26, with some salts of lime and potass. The envelop or *shell* contains tannin, and hence if peas be boiled in a rusty iron pot, they will be blackened.

When peas are manufactured into meal, the envelop is removed, for if allowed to remain its qualities would be less agreeable. In the manufacture of the finest quality, or "brose meal," the foreign white and the field grey pea are mixed, in various proportions; the finer qualities being made chiefly from the first, and the inferior from the second. The quality also depends upon the greater or less portion of the envelop which is removed; or on the quantity detached by the process of *shealling;* for the central portions of the pea are the most agreeable.

Uses. Various opinions are entertained respecting the nutritive properties of the pea, when compared with the cereal grains, such as wheat, barley, oats, &c. Dr. Cullen was of opinion that the leguminous seeds or pulse are more nutritive than corn; and a similar impression prevailed at one time very extensively among the peasantry of Scotland. This belief has of late gained additional support from chemical investigations; for the pea contains considerably more nitrogen than the various kinds of corn. According to M. Boussingault's analysis, 120 parts of yellow peas are equivalent, in nutritive power, to 191 of wheat, or 1096 of potatoes.* As these calculations are still chiefly founded on theoretical results, they ought not to be implicitly relied on; at the same time, both theory and experience warrant us in saying that the pea is not inferior to wheat or other kinds of grain in nutritive properties. The pea is also easily digested, and is less liable to produce acidity than oats, barley, &c. It is well adapted as a farinaceous aliment,

* British and Foreign Medical Review, April 1842.

for those who have weak digestive organs, particularly if the fine meal be employed. A considerable quantity of boiling water should be mixed with the farina in making the preparation, so as to give it a thin consistency; for by this means it is better cooked and more digestible. Boiling injures its sweet and agreeable qualities. It is an excellent species of food for children, particularly those who have derangements of the stomach and bowels, and when proper attention is paid to the quality of the meal and the cookery, it is generally highly agreeable to them. In the green state, peas are very tender, easily digested, and better adapted for those who are troubled with indigestion, than any other green vegetable; provided they are simply boiled in water, and used with the addition of little or no butter. This pulse is generally considered liable to produce flatulency, and this opinion may apply to the ordinary kinds of meal; but certainly the finer qualities of this article produce no such effects. The pea is also used for feeding horses, and it is stated by some authors that hogs are readily fattened by it. The green straw is reckoned as nourishing as hay, and is excellent food for sheep.

THE BEAN.

Vicia Faba.—Leguminosæ.—THE PEA TRIBE.—This plant was much esteemed among the ancients. The Athenians used sodden-beans in their feasts to Apollo, and the Romans held a festival called *Fabaria.* The farina of the bean was considered a strong species of food, having a tendency to dull the senses; and hence Pythagoras expressly forbade beans to be eaten by his disciples. The Romans, at one period, believed that the souls of the dead resided in beans; and hence they were eaten at funerals. Bean meal, called *lomentum* by the Romans, was a celebrated cosmetic among the ladies for removing wrinkles.

The bean is extensively cultivated in this country, chiefly as a very nutritive and strengthening food for horses. According to Einhof, the bean contains starch, gluten, albumen, saccharine extract, gum, amylaceous fibrin, and some salts of lime and magnesia. The envelop or external covering contains tannin; hence beans will be blackened if boiled in a rusty iron pot.

Uses. The bean agrees in dietetic properties with the pea, but is less agreeable and rather more difficult of digestion; it is therefore seldom used by man in its ripe state. In the green state, the garden bean is used as a constituent of broths and other culinary preparations; and when deprived of its envelop, forms an agreeable and digestible addition; but like other green vegetables it sometimes produces acidity or flatulency.

KIDNEY OR FRENCH BEAN.

Phaseolus Vulgaris.—Leguminosæ.—The Pea Tribe.—This vegetable is supposed to have been brought from Asia into this country; but it has been cultivated in Europe almost from time immemorial, in gardens and in the open fields. There are many varieties of this plant, and it flowers from July to September. The flowers are white, red, or purple; the pods are slightly swollen over the seeds, which are generally kidney-shaped, sometimes ovoid, smooth, shining, and when ripe varying in colour, being either white, black, blue, or spotted. Speechly suggests that it might become an object of field culture in this country, more especially as in good land it will grow luxuriantly even in a dry season; in which respect it differs from most culinary vegetables. It is cultivated in the fields in a great number of warm countries, especially in France and America. According to Braconnot the dry kidney-bean contains starch 42.34, gluten or legumin 18.2, gum 5.36, small quantities of sugar, pectic

acid, a yellow grease, amylaceous fibrin, salts of potass and lime, envelop 7.0, water 23.0.

USES. The unripe pods are generally used in Britain, and are in great estimation throughout the year, being produced by forcing when they cannot be grown in the open air. They are preserved in salt and vinegar, and used as a pickle. On the continent, the ripe seeds are much used in cookery, forming *haricots* of various kinds, and are also frequently employed in the formation of soups, pottage, &c.

At the end of the season the crop is dried, the beans being thrashed out and preserved for use during the winter.

This legume is in general very easily digested, but when seasoned with much butter ought to be avoided by the dyspeptic. It is stated by some authors, that it is less liable to produce flatulency in the green state than when ripe. This may be true with respect to healthy individuals; but when the digestive organs are weak, the young is more liable than the full-grown vegetable to produce acidity.

ARROW ROOT.

Maranta Arundinacea.—Marantaceæ.—THE ARROW ROOT TRIBE.—This plant is cultivated to a considerable extent in the East and West Indies, America, &c., for the manufacture of arrow-root. In Jamaica it is reared in gardens and other similar grounds. It has received its name arrow-root because the root of the plant is applied, by the Indians, to wounds inflicted by arrows; but the arrow-root or starchy principle is also prepared from the roots of the *maranta indica* and other plants. The *maranta arundinacea* is about two or three feet in height, has small white flowers, and a white articulated tuberous root, having long jointed stoles. The fresh root contains,

according to Benzon, a little volatile oil, albumen, gummy extract, fibrin, salts, and 26 per cent. of starch. It appears, however, that the whole of the starch is not extracted from the root, in the usual mode of manufacture; for according to Merat and De Lens, one pound of the root furnishes only two ounces of arrow-root. It is prepared in the following way. The roots, when about a year old, are washed and bruised to a pulp in a wooden mortar. The pulp is then well agitated with a large quantity of cold water, which is rendered white by the starchy powder floating in it; and the latter is freed from the fibrous matter by straining through a sieve, which allows the starch and water only to pass through. The powder is afterwards dried by the heat of the sun. Arrow-root is a white granular powder, having a farinaceous insipid taste, a slightly glistening appearance, and it crackles when rubbed between the fingers. It makes a firm jelly with boiling water, and in this respect it is superior to wheat-starch. (Christison). It is imported from most of the West India islands in boxes and tin cases; and the arrow-root of the Bermudas is generally considered the finest by druggists.

ADULTERATION. Arrow-root is sometimes adulterated, and this is done most frequently with potato-flour. Various methods have been recommended for the detection of such adulterations; but none of them can be considered accurate tests. The most simple method is an examination of the suspected article by the microscope. The globules of arrow-root are thus found to be small, elliptical, pearly, or translucent. By an ordinary magnifier, the difference between potato-starch, arrow-root, and wheat-starch, may be tolerably well ascertained. Potato-starch, when viewed through this medium, has the appearance as if densely studded with minute globules of mercury. Arrow-root has a pretty near resem-

blance to refined sugar reduced to powder; and wheat-starch exhibits a glistening appearance. The sophistication of arrow-root with potato-flour, wheat-starch, or any other pure amylaceous product, is not injurious, in as far as the health of the community is concerned; for though genuine arrow-root is perhaps slightly superior to one or more of these, yet the difference between them, in point of digestibility and nutritive power, is very little. At the same time as arrow-root is generally much higher in price than any of the substances mentioned, this practice ought to be considered as a fraudulent imposition.

Uses. Arrow-root is an exceedingly digestible and moderately nutritive species of aliment. It is well adapted for those who have delicate digestive organs; for like other starchy products it is easily acted on by the gastric jûices, and is little liable to produce acidity. It is also a suitable diet for infants and young children; for when combined with milk it is sufficiently nutritive. It may be prepared either with water or milk, or with a mixture of these liquids. A table-spoonful of arrow-root will form, with a pint of liquid, a tolerably firm jelly. Some persons simply pour the boiling water upon the arrow-root, and unite them by stirring; but boiling for a few minutes is a better method, in point of cookery. A little salt or sugar is an agreeable addition, if moderate in quantity; but the first ought to be preferred by the dyspeptic. Arrow-root is generally taken with milk, wine, or some aromatic liquid, and sometimes with jelly. The former is generally the most agreeable; but when it disagrees with the stomach, diluted wine or ginger cordial may be used. Arrow-root may be formed into a nutrient drink for children who refuse to swallow it in the solid state. Half a pint of milk, the same quantity of water, and from one to two tea-spoonfuls of arrow-root, when boiled together will form a mixture of suitable consistency.

East India Arrow-root. Mr. Pereira describes two varieties of East India arrow-root.

1. The white, which does not crepitate between the fingers to the same extent as that from the West Indies.

2. The buff-coloured, which is often intermixed with husks and other impurities. These varieties are extracted from the *curcuma angustifolia*, which belongs to the ginger tribe of plants, and perhaps from other species of curcuma. They are seldom used for dietetical purposes, but are bought by starch-manufacturers in this country.

Brazilian Arrow-root. According to Mr. Pereira, Brazilian arrow-root is made from the root of the same plant which furnishes the tapioca of commerce; namely, the *jatropha manihot*. It is white and pulverulent, and its granules are smaller than those of arrow-root and quite spherical. Its properties are similar to those of tapioca.

Tous les Mois. This starchy matter resembles potato-flour in its glistening appearance and size of globules, which are even a little larger than those of the latter. It is procured from the root of the *canna coccinea*. Dr. Christison considers it at least equal to arrow-root, and it furnishes fully a stiffer jelly. It is generally imported from St. Kitts.

SAGO.

Sagus Lævis.—Palmaceæ.—The Palm Tribe.—Sago is a species of starch procured from several palm trees, but chiefly from the *sagus rumphii*, *sagus lævis*, and *saguerus rumphii*, which grow in Borneo, Sumatra, Malacca, and the islands of the Indian ocean. The pith of the tree is the part from which sago is prepared, and the method for its extraction varies somewhat according to the country in which it grows. The tree is supposed to have arrived at maturity when about the age of fifteen or twenty years, or when the superior leaves are covered

with a farina or white powder; but those that are young contain the most pith or medulla. The trunk of the tree is divided into portions and split longitudinally, and the interior part or pith, which is tender and spongy, is taken out. It is sometimes eaten by the natives in this state, after being boiled for a short time; but more frequently the pith is subjected to the following process. After being bruised, it is put into sacks made of the fibrous matter of the palm, and washed with a stream of water. The water carries along with it the starchy matter, and leaves the fibrous portion of the pith in the sack; but the deposit requires repeated washing for its thorough purification. It is afterwards made into bread, soups, pastes, and is cooked with milk, sugar, and aromatics. It is one of the most ordinary kinds of food used in the Moluccas; and some trees will furnish five or six hundred pounds of this product. The wood is made into boxes, and used for other economical purposes.

Commercial sago is found in three forms:—

1. *Sago meal*, which is rarely sent to this country, is found in the form of a powder resembling arrow-root, of a whitish colour, with a tint of red, and a peculiar odour. Its starchy globules are unbroken, and it is insoluble in cold water.

2. *Common or brown sago* resembles in appearance and size pearl-barley, being brownish or whitish in colour; its globules are entire, and it is not soluble in cold water. This variety was at one period employed in this country much more generally than pearl sago.

3. *Pearl sago* has the form of small round grains, of a pearly lustre, semi-translucent, of a whitish, greyish, dingy, or yellowish-white colour, which are partially soluble in cold water. From this latter property, it is highly probable that some degree of heat has been em-

ployed in giving it this form; but the manipulations employed are not exactly known. Its taste is agreeable, farinaceous, but slightly insipid. It is chiefly imported from Singapore.

Uses. Sago, being a pure amylaceous product, is moderately nutritive, very digestible, and well adapted as aliment for children and those who have delicate digestive organs; while its granular shape renders it more agreeable to some persons. It may be prepared either with water or milk, or a mixture of these liquids. Some seasoning is necessary, such as salt, sugar, or an aromatic. The addition of eggs, much sugar or milk, is injurious to those who are troubled with indigestion. The following mode of preparing sago for children or invalids may be adopted:—Take half a pint of milk, the same quantity of water, a table-spoonful of sago, and a little salt or sugar; macerate the sago in the mixture of milk and water for about an hour, then boil until the whole is converted into a soft pulp. Sago has, within these few years, been successfully employed in feeding some domestic animals, particularly the horse.

CASSAVA AND TAPIOCA.

Jatropha Manihot. — *Euphorbiaceæ.* — The Euphorbium Tribe.—The bitter cassada is a shrubby plant, indigenous in South America, from whence it has been carried to the West Indies, &c. by the negroes. It has palmated leaves, green flowers, fleshy agglomerated roots, which sometimes attain the thickness of the thigh, and have a grey, green, or red colour externally, according to the variety cultivated, but the interior is always white. The roots contain a large quantity of milky juice, which is very poisonous, causing death when swallowed by birds, quadrupeds, and man. This poisonous principle is volatile. It is stated by some authors, that if the juice

be exposed to the air for thirty hours, it entirely evaporates, and that boiling has the same effect on it. By distillation it may be collected in the form of a liquid, which operates with extreme violence, half a tea-spoonful being sufficient to kill a dog in five minutes. According to Dr. Christison, the poisonous principle is hydrocyanic acid. The native Indians use the juice of this root for poisoning their arrows, so virulent are its properties.

Notwithstanding the very deleterious nature of this juice, the root, when deprived of it, is very nutritive and wholesome. There are several methods of rendering the root fit for aliment. The first is to expose it to heat; but the following plan is frequently adopted. The roots, from the age of six months to two years, are dug up, immediately washed, scraped and grated into a pulp, which is put into a sack, and submitted to pressure until all the milky juice procurable is forced out. A white powder is deposited from the juice, which is preserved for alimentary uses; the matter which remains in the sack is dried by the heat of a stove, and afterwards reduced to powder, and sifted to free it from the fibrous matter. This powder is made into round thin cakes, and baked upon plates of iron or clay. The bread is named *cassava*, and may be preserved for a long time if kept dry.

Tapioca—is obtained from the same plant by drying the fecula or starchy powder on heated metallic plates. It generally has the form of hard, dry, irregular, or warty grains, of a white or dingy-white colour, with sometimes a starchy efflorescence on its surface, and a farinaceous agreeable taste. It is partially soluble in cold water, which is, to a certain extent, evidence of the employment of heat in its manufacture. When the starchy powder is dried without heat, it is imported under the name of *Brazilian arrow-root, tapioca-meal*, &c. The pulp of

the root is sometimes dried by smoke, and being pulverised is named *cassava-powder.*

Uses. Tapioca is more frequently used in this country than cassava; but both are nutritive, pleasant, and very digestible kinds of food. Tapioca may be classed as one of the strong amylaceous products, and is well adapted as aliment for children, invalids, and those who have delicate digestive organs. It may be prepared either with water or milk, or with a mixture of these liquids. As it is very hard, it is generally necessary to macerate it in the liquid in which it is to be boiled, for an hour or two, before this process is commenced. A table-spoonful of tapioca is generally sufficient for a pint of milk or water, provided the boiling be continued for a sufficient length of time, or until the whole is converted into a soft pulp. It is often made into puddings, with the addition of a considerable amount of eggs, sugar, wine, aromatics, &c.; but a compound of this kind is more difficult of digestion than a simple combination of it with milk or water, with the addition of salt, aromatics, or a little refined sugar. Tapioca is occasionally employed in the starching of linen, and by straw-bonnet makers, as it is believed to have more effect in stiffening the straw than some of the other starchy products.

British Tapioca.—Within these few years, an excellent species of tapioca has been made from potato-flour; and its resemblance to the real is so near that they can with difficulty be distinguished by the naked eye. It is white, hard, granular, agreeable, and farinaceous in taste. The globules of real tapioca are spherical, very small, equal in volume, and resemble those in wheat-starch; whereas those in British tapioca are large and elliptical in form. By the aid of an ordinary magnifier, the globules which exist in potato-flour may be discovered upon the surface of the granules of British tapioca, and resem-

ble minute globules of mercury; while, in the foreign variety, no globules are discoverable through this medium, but here and there some glistening points. For ordinary dietetical purposes, British may be considered very nearly equal to foreign tapioca.

SALEP.

Orchis Mascula.—Orchideæ.—THE ORCHIS TRIBE.—Salep is procured from a great variety of the orchis tribe of plants; but most frequently from the *orchis mascula*, which grows in almost all the countries of Europe, in Persia, Turkey, along the coast of the Mediterranean, &c. The salep of commerce, however, is not prepared in this country, but is generally imported from Asia Minor and Persia. It is prepared in the following way. The bulbs or roots of the orchis are dug up, washed, put into boiling water to facilitate the detachment of their exterior covering. They are then dried by the heat of the sun, or baked in an oven for ten or twelve minutes, and are capable of being preserved for a long time in this state. The dried bulbs vary in size from that of an olive to a cherry-stone, have an irregular oval shape, a yellowish-white colour, are semi-transparent, horny, and very hard in texture, generally destitute of odour, and have a taste similar to that of gum tragacanth. They are reduced to powder with some difficulty, and, in order to facilitate this process, they are previously moistened with water. The pulverised bulbs are sold under the name *salep*, which is sometimes termed saloop or saloup in popular works, and in appearance, taste, &c., resembles dark-coloured gum arabic in the state of powder. It has a dingy yellowish-white colour, its taste is very similar to that of gum tragacanth, and it adheres to the teeth when chewed. Dr. T. Thomson considers salep a variety of starch. Pfaff and Caventou endeavour to show that

it consists chiefly of vegetable mucilage, or of a principle analogous to gum tragacanth. It also contains a small portion of starch, a volatile substance of a disagreeable odour, and a bitter and acrid extract. It requires for its solution a large quantity of water; about sixty parts of boiling water being necessary to dissolve one of salep, and the resulting mucilage is very thick.

Uses. Salep has a high character in Eastern countries as a restorative, &c. It is believed to contain the greatest quantity of nutriment in the least possible bulk, and one ounce is reckoned sufficient to nourish a man for twenty-four hours. These opinions are extravagant, but its nutritious properties are nevertheless considerable, and perhaps greater than those of the ordinary starchy aliments. It is made into jellies, pottage, pastes, &c., with the addition of sugar and aromatics. It is used as a diet in pulmonary consumption, hectic fever, dysentery, &c.; and being nutritive and easily digested, is well adapted for these complaints. It is sometimes employed, in place of gum arabic, for glazing cloth.

THE POTATO.

Solanum Tuberosum. — *Solaneæ.* — The Nightshade Tribe.—This herbaceous plant is one of the most important vegetables cultivated by man. It is capable of growing in almost every climate, but it thrives well only in the mountainous districts of tropical countries. It may be reared in every variety of soil, provided it have sufficient depth. The native country of the potato is not exactly known. Pavon states that it grows wild in the environs of Lima; and it has been found growing spontaneously at Mexico, but its roots or tubercles are only about the size of a hazel-nut. The date of its introduction into Europe is not exactly fixed. Sir Walter Raleigh brought it from North America to

Britain in the year 1584, from which it was carried to Ireland and many other countries of Europe. It appears to have been introduced also from Peru into Belgium, and other countries in the possession of the Spaniards, about the same epoch, or perhaps at an earlier period. A considerable number of years elapsed, after its introduction into this country, before it was generally cultivated. The nobility and gentry of England planted the potato in their gardens about the year 1620, as a curious exotic; and in 1684 it was cultivated in the open fields, to a small extent, in Lancashire. It was first reared in the open fields in Scotland, by Thomas Prentice, a labourer in Kilsyth, about the year 1728. When first introduced, many persons were prejudiced against it on account of its supposed narcotic properties; and this was believed solely because it belongs to a poisonous family of plants. In Burgundy, the culture and use of potatoes were interdicted, as the root was believed to be poisonous and mischievous; a notable example of the absurdity of preconceived notions, when opposed to experiment and observation. A great many varieties of potatoes have been generated by their cultivation in different localities, soil, &c., and by sowing the seeds. Sir John Sinclair has enumerated a number of these; but as they are constantly varying, it is unnecessary to particularise them. The qualities considered most essential in their cultivation are earliness in ripening, quantity, agreeable taste, and capabilities of preservation. The reddish-coloured potato is much esteemed, and those that are rough in the skin and heavy are considered the most farinaceous.

In storing potatoes for winter use, the principal points in their preservation consist in keeping them dry, and securing them from frost. This may be done by four methods. First, in houses, such as is often practised in

this and other countries. In Sweden, the farmers build houses ten or twelve feet high, of clay and straw, having a wall about six feet thick, over a pit four or five feet deep, for their reception. Second, they are deposited in vaults and cellars; but such places are in general found too warm, and the potatoes are apt to vegetate. Third, in some countries caves are dug on the sides of a hill, about six yards wide and ten feet deep, and when filled with potatoes, a stack of stubble or straw is built over the opening. Fourth, a very common plan in this country is to collect the potatoes into a heap on the surface of the ground, and cover them with straw and earth to a depth sufficient for the exclusion of rain and frost.

According to Einhof, the red potato contains starch 15.0, fibrous starchy matter 7.0, albumen 1.4, mucilage 4.1, acids and salts 5.1, water 75.0. Potatoes also contain a small portion of crystallisable asparagin, and a minute quantity of a yellow fixed oil, but the oily principle is not discovered after cooking.

It thus appears that this root contains nearly 75 per cent. of its weight of water and 15 of starch; thus a large quantity of water is swallowed along with it when taken as food. From the quantity of its contained starch, it might naturally be expected that this substance would be dissolved by the water during the process of boiling, and form with it a gelatinous liquid. The non-occurrence of this is explained by an examination of the structure of the potato. The roots or tubers are cellular in structure, and each cell contains from ten to twelve grains of starch. In these cells, and in the spaces between them, there is an albuminous liquid. By boiling, the starch absorbs the liquid and swells up, while the albumen, being coagulated, forms irregular fibres. During the germination of the potato, no sugar is formed, as in that of the various kinds of corn; and their increase of

weight is owing to the absorption of water. It is a common opinion that the buds of the potato are not wholesome; and this belief has been confirmed by the experiments of Otto, who has found them to contain the narcotic principle named *solanine*.

When potatoes have been frosted, the part affected acquires a bluish colour, becomes softer in texture, and soon runs into decomposition. When boiled they have a sweetish taste, from the generation of sugar, and are not so free or farinaceous in texture. Some very important results have lately been obtained by M. Gerardin respecting this subject. He was requested by the Society of Agriculture of *la Seine Inferieure* to examine the chemical constitution of frosted potatoes, as immense losses had been sustained by the small farmers in consequence of their rejection as useless and unfit for aliment. He found them to contain exactly the same proportions of starch, fibrous matter, albumen, &c., and the starch possessed all the qualities of that extracted from sound potatoes. Even after they had become very soft or semi-fluid, and were exhaling a disagreeable odour, the starchy principle was found entire. When the frozen potatoes are as hard as wood, they should, according to M. Gerardin, be put into cold water for some hours, in order to soften them; they are then to be crushed in a mortar to the consistence of a fine homogeneous *bouillie* or pulp, and washed on a sieve with a stream of cold water, so as to separate the starch. When the farina of potatoes is only wanted, nothing more is necessary than to put them into sacks, and submit them to pressure, so as to squeeze out as much water as possible, then to dry them in a stove and grind them into meal.* Sir John Sinclair relates a curious instance of the starchy principle being

* Journal de Pharmacie, Juin, 1838.

recovered from a parcel of frozen potatoes. "In 1794, a field of potatoes at Camstradden, in the county of Dumbarton, was laid under water by the sudden rise of Loch Lomond. A quantity of them were dug up, and being wet, they were laid on the floors of out-houses to dry; but in a few days it was found that they were spoiled so much as to be unfit for feeding cattle. When a heap of these potatoes, which had been left on the ground, was turned over next year, a quantity of starch was found." A sample of this starch was sent to Sir John Sinclair in 1826, and, after being kept for thirty years, seemed to be as good as the produce of that season.

Uses. Notwithstanding all that has been written against the wholesome and nutritive properties of the potato, there is no species of aliment consumed to such an extent in this country. In Ireland the working population subsist almost entirely upon it, and in respect of hardy and vigorous constitutions they are at least equal to those of any other country. There is no kind of farinaceous aliment, with the exception of bread, which is so indispensable to a family as this root, and it is very nutritive and easily digested by persons of healthy digestive organ. Even those who have weak assimilating organs may use a moderate quantity of potatoes with impunity, provided they are of good quality. The amount of potatoes necessary for the support of a family, consisting of a man, his wife and four children, is calculated by Sir John Sinclair to be about 14,000 pounds for a year, or nearly 7 pounds to each individual, daily. Contradictory estimates of the nutritive powers of the potato when compared with corn or other aliments, have been made by authors; but as one-fourth of this root consists almost entirely of alimentary matters, it may be assumed that 4 pounds of potatoes are nearly equivalent

to 1 pound of flour, or to rather more than $1\frac{1}{4}$ pounds of bread.

The nutritive power of the potato varies, however, according as it has been kept for a longer or shorter period; for according to M. Boussingault, this root contains more azote when new than when old, and is consequently less nutritive in spring and summer. Potatoes are generally cooked by boiling with water; but they may also be roasted. In whatever way prepared, they ought, if good, to possess a farinaceous or *mealy* character; so that they may be easily broken down into powder. If hard, watery or waxy, they ought not to be used, particularly by those who are liable to acidity, flatulency or any other form of dyspepsia, as they are very indigestible in this state. As the boiling of potatoes, in relation to their digestibility, is very important, Sir John Sinclair's excellent observations on this subject may be here quoted. "The potatoes should be sorted to have the larger and smaller boiled separately. After being thoroughly washed they must be put into a vessel, with less water than what is sufficient to cover them, as the potatoes themselves will produce a considerable addition of fluid, before they begin to boil. Sea water is sometimes used, but it renders them tough; but a little common salt is of great use when thrown into the water, as it renders the potatoes freer. If the potatoes be tolerably large, it will be necessary, as soon as they begin to boil, to pour in some cold water, and occasionally to repeat this addition till by trial they are found boiled to the centre. If this be not attended to, they will crack on the outside, while the inside will be nearly in a crude state. The water should be immediately poured off after they are thoroughly boiled, and the vessel should be replaced on the fire, till the water adhering to them is completely evaporated." Proust states that potatoes lose during cooking from 12 to

15 per cent. of their weight; but nothing if they do not break. According to Dr. T. Thomson the loss is from 1 to 1½ per cent. of the weight.

Potatoes are employed in the manufacture of an ardent spirit, and in France it is conducted on two principles. 1. By simply fermenting the boiled potatoes along with malt and yeast. 2. By converting the starch of the potato into sugar, by means of sulphuric acid, and subsequently fermenting the saccharine fluid which is thus formed. The advantages of using potatoes for this purpose are said to be the following; namely, that they are cheap, afford a good spirit and an excellent residuum for cattle, while the grain is economised and less yeast required. The leaves and stems of the potato are sometimes used in feeding cattle, although doubts have been started by some authors regarding their wholesome qualities. The root is however used in almost every country where the potato is cultivated for this purpose; and is well adapted for the nourishment of almost every domestic quadruped and bird. In many cases it is boiled before use; a rule the advantage of which is admitted by many agriculturists.

Potato-starch or Potato-flour.—This article is now manufactured to a considerable extent in several districts of Scotland; and its employment in the arts and as an alimentary substance is on the increase. In its manufacture, the potatoes are first washed in a cylindrical cage, which revolves in a trough filled with cold water. They are then reduced to a pulp by a rasping machine or other mechanical contrivance; and this is afterwards washed, upon a sieve, with cold water, applied in the form of a divided stream. The starch falls to the bottom of the vessel containing the water which has drained through the sieves, is again washed or bleached and subsequently dried. The process is by no means expensive, and may

be conducted very rapidly. Potato starch is very white, friable, tasteless, without odour, and closely resembles arrow-root in appearance. When examined with an ordinary magnifier, its globules are found to be much larger than those of arrow-root, and resembling small globules of quicksilver viewed with the naked eye. The globules of the starchy principle named *tous les mois* are also very large, and in this respect might be confounded with potato-starch. Potato-flour is a weaker variety of starch than arrow-root, and forms a less consistent jelly, which is sometimes a little tenacious or cohesive. It possesses the advantage, however, of being thoroughly cooked, simply with the addition of boiling water.

Uses. Potato-flour is moderately nutritive and very easily digested; and though perhaps slightly inferior to arrow-root and some other amylaceous products in the first property, the difference is very immaterial. Some individuals have a prejudice against it, believing it to possess the flatulent qualities of the potato itself. This is entirely a misconception on the part of the public; for the whole of the matters which, in the case of the potato, produce this and other disagreeable effects in some individuals, are completely separated in its manufacture.

It is also comparatively much cheaper than arrow-root, is at least equally agreeable, and possesses the advantage of being a product of this country. Indeed, in seasons where the corn crops have more or less failed, it might form a very excellent and wholesome constituent of bread; for, as has been already stated, it may be manufactured very easily either from sound or frosted potatoes. I have ascertained, from some experiments made by a baker, that loaf-bread may contain one-third of its weight of potato-flour without being much deteriorated in nutritive or agreeable qualities. For ordinary dietetical use, a large table-

spoonful of potato-flour, a little salt and a pint of water, will form a mixture of sufficient consistency. It may be managed in the following way. Mix the flour well, with two or three table-spoonfuls of cold water; then add the requisite quantity of boiling water, so as to make up a pint; constant stirring being employed whilst this is being done. It may be taken with milk, or wine diluted with water and sweetened with sugar. Ginger cordial is also an agreeable accompaniment.

British Tapioca—is manufactured from potato-starch; but an account of this is given under the article Tapioca. A kind of sago is also made near Paris from potato-starch.

Potato-flour is used for starching clothes, and for this purpose it is often manufactured on a small scale by housewives in the country. It is employed in the starching of yarns, in the glazing of linen and cotton cloths, and for other purposes in the arts. It does not form such a strong starching agent as wheat-starch; and what is manufactured on the small scale is sometimes dingy in colour, from defective washing or bleaching.

BATATAS.

Convolvulus Batatas.—Convolvulaceæ.—The Bindweed Tribe.—This plant is a native of South America, but is also cultivated there and in the West Indies. The rearing of it has been attempted in this country and on the Continent, but without success. The roots are tuberose, fleshy, fusiform, of a red, white, or yellow colour, have a saccharine farinaceous taste, and are sometimes found half a pound or more in weight. According to M. O. Henry, the roots contain starch, albumen, uncrystallisable sugar very fermentable, a volatile matter, a fatty matter, parenchyma, malic acid, salts and about 73 per cent. of water.

Uses. It is cooked by boiling with water, but is sometimes roasted. The boiled leaves are also used, being eaten like spinage. A species of cake is made at Barbadoes from the root, which is said to be nutritive and digestible. The root resembles the potato in some of its properties; and contains about 13 per cent. of starch and about 73 of water; but it is certainly inferior to the potato in taste, productiveness, facility of culture and digestibility; being more liable to produce acidity of stomach and flatulency than the latter root. In Brazil, a fermented liquor is prepared from it; and at Java a species of ardent spirit.

YAMS.

Dioscorea Alata, Bulbifera et Sativa.—Dioscoreæ.—These are herbaceous plants, which grow in tropical countries; and their bulbous roots are much used as food in the Indies, part of America and the South Sea islands. It is stated that they grow wild in Ceylon and on the coast of Malabar. They were first cultivated in England in 1733; but the assistance of artificial heat is required to bring them to perfection in this country. The species named *dioscorea alata* is most frequently cultivated, and its roots are about the size of the beet-root, have a blackish-violet colour externally, and a dirty white or flesh-tint internally. In the raw state they are viscous and insipid, but when boiled or roasted they are pleasant, contain a considerable quantity of nutriment, and are much esteeemd by negroes. The roots of this species sometimes attain the weight of from 10 to 20 pounds; but those of the *d. bulbifera* are said to be about the size of potatoes.

RED BEET.

Beta Vulgaris.—Chenopodeæ.—The Goose-foot Tribe. —This plant is cultivated in gardens and in the fields.

It presents two varieties; namely, *la carde*, distinguished by its large leaves, which are eaten as salad, and its hard branchy and smaller roots; the other, named *betterave*, the root of which is large, fleshy, and the colour deep red, white, or golden yellow. The common size of the red variety is about twelve inches long and three or four in diameter, but it sometimes attains the weight of from twenty to thirty pounds. It contains, according to Payen, sugar, the greater part of which is crystallisable, albumen, fibrin, a nitrogenated matter, extractive, a red and a yellow colouring matter, fixed oil, salts, acids, and water. The proportion of sugar which it contains is from 5 to 9 per cent. of the weight of the juice.

Uses. Beet-root when thoroughly boiled or baked in an oven, is sweet, agreeable, tolerably digestible, and contains a considerable quantity of nutritive matter, which is estimated, by Sir Humphrey Davy, to be about 15 per cent. It is liable to produce flatulency when eaten in quantity, more particularly if it be not sufficiently boiled; for it requires a longer exposure to heat than many other vegetables before it is sufficiently softened. It is also frequently used as a pickle and in the feeding of cattle. The most important use to which beet-root is applied is in the manufacture of sugar. Margraff was the first who called the attention of chemists to the importance of this root; but Achard of Berlin and Chaptal in France made us acquainted with the methods of manufacturing sugar from it, on the large scale. This occurred during the reign of Napoleon, when colonial sugar attained a very high price. The yellow coloured root is generally preferred for the extraction of sugar, most probably because it contains less colouring matter; but the red beet is also used to a great extent. This manufacture is carried on in France, Belgium and Germany; but owing to the duty, it cannot profitably be carried on

in Britain. The process employed is very similar to that practised for the extraction of sugar from the sugar-cane; and beet-sugar is said to be very excellent. The cake that remains after the juice is pressed out, being dried and roasted, is used in place of malt in the manufacture of beer. It is also employed in the feeding of cattle. An ardent spirit may be obtained from the juice fermented; and in Poland the pulp of the root is allowed to go into an acid fermentation, in order to convert it into an antiscorbutic aliment.

CARROT.

Daucus Carota.—Umbelliferæ.—The Umbelliferous Tribe.—The carrot is a native of Britain and other countries of Europe, and is common in pastures and the borders of fields where the soil is gravelly. In the wild state, the root is small, branched, hard, has a white colour, strong flavour, and a bitterish taste. The root of the cultivated variety, *daucus sativa*, is large, fusiform, sweet, succulent, of a red, yellow, or pale straw colour. According to Vauquelin and Wackenroder, the roots contain fibrin, a yellow or reddish juice, in which is found both crystallisable and uncrystallisable sugar, a little starch, extractive, gluten, albumen, a colouring matter, which is crystallisable, named *carotine*, volatile oil, acids and salts. The carrot contains about fourteen per cent. of nutritive matter.

Uses. When thoroughly boiled, this root becomes soft and pulpy, is very nutritive, and less liable to produce flatulency than the turnip and many other green vegetables, although a little difficult of digestion. The carrot is sometimes roasted for the purpose of giving colour and flavour to soups, or is used in place of coffee. It is occasionally dried and reduced to powder, for the preparation of bread, soups, &c., during long voyages.

Carrots are employed extensively in feeding oxen, hogs, horses, &c.; and the latter are said to be so fond of them, as to prefer them to oats. They are also used in distillation, and owing to the large quantity of their contained sugar, they yield more spirit than the potato, the usual quantity procurable from a ton being about twelve gallons. The juice of the carrot is frequently used by farmers to give pale-coloured butter a yellowish tint; and it is probable that the yellow-coloured crystals of the root, or *carotine*, are dissolved by the butter, as this principle is soluble in oils and fatty bodies. M. Antoine states that the pulp of the carrot, boiled with double its weight of rancid butter and as much water, possesses the property of removing the rancidity. When boiled to a very soft pulp, carrots are used as a poultice to cancerous ulcers. They are soothing and emollient, but in many cases are not superior to poultices made of linseed-meal or loaf-bread. An infusion of carrot-seeds is a popular remedy for flatulency and gravel.

PARSNIP.

Pastinaca Sativa.—Umbelliferæ.—The Umbelliferous Tribe.—The parsnip is a native plant of Great Britain, and is found on dry banks, hillocks, and the borders of fields. Its root is spindle-shaped, white, sweet, and mucilaginous, accompanied with a certain degree of acrimony, which it loses, to a great extent, by cultivation. The roots of the cultivated parsnip are also more thick and fleshy; but it does not differ so much from the native plant as the cultivated differs from the wild carrot. It has been reared for a long period in the gardens of this country, was formerly much used, and during Lent was eaten with salted fish. Mr. Neill states, that "in the north of Scotland parsnips are often beat up with potatoes and butter, of which the peasantry are

very fond. In the north of Ireland, a pleasant table-beer is prepared from the roots, with the addition of hops. A species of wine is also made from them; and they afford an ardent spirit, after a preparatory process similar to that bestowed on potatoes destined for that purpose." The cultivated root contains a considerable quantity of saccharine matter; and Mr. Philips states, that in Thuringia the country people evaporate the juice to the consistency of a syrup, which they eat with bread instead of honey, and use it in many cases in place of sugar. The root contains a considerable quantity of nutriment, is sufficiently digestible, but liable to occasion flatulency when eaten in the raw state.

VIPER'S GRASS.

Scorzonera Hispanica.—Cynarocephalæ.—This plant is a native of Spain, its roots are simple, elongated, black externally, white and fleshy within, sweet and saccharine in taste, especially when cooked. The shoots of this plant are eaten occasionally as salad, and when cooked; but the root is more frequently employed. It contains a saccharine and mucilaginous juice, and forms an agreeable aliment when boiled. In Italy the leaves are used in the rearing of the silk-worm. At one period this plant was believed to possess extraordinary powers as an antidote to the bite of the viper, and in curing the plague and intermittent fevers.

JERUSALEM ARTICHOKE.—FRENCH BATATAS.

Helianthus Tuberosus.—Corymbiferæ.—This plant is a native of Brazil, but is now cultivated in all the countries of Europe. It resembles the sunflower in appearance, and attains the height of eight or ten feet. Its roots are composed of large, fleshy, oblong tubercles, red

externally, but white within, and very similar to potatoes. According to Braconnot, the fresh root contains uncrystallisable sugar 14.8 per cent., inulin 3.0, and small quantities of gum, albumen, fixed oil, salts, and about 77 per cent. of water. From the large quantity of its contained sugar, it is capable of fermenting readily, on the addition of yeast. According to Payen, 9 per cent. of its weight of alcohol can be procured from it.

Uses. These roots, when cooked, have a sweet and agreeable taste, which is similar to that of the common artichoke, and are, in general, very digestible; but have a tendency, in some individuals, to produce acidity and indigestion, more especially if saturated with butter. They are inferior to the potato in productiveness and nutritive qualities. They are sometimes employed in feeding cattle.

TURNIP.

Brassica Rapa.—Cruciferæ.—The Cabbage Tribe.—The turnip is a biennial plant, which grows wild in some parts of England, but is better known as cultivated in the gardens and fields of every country in Europe. Its roots have a round or globular shape, a white or yellow colour, a fleshy texture, and a sweet taste; but the skin, in addition to this quality, possesses a slight degree of pungency. Berzelius states that the juice of this root has much analogy to that of the beet, and contains vegetable albumen, and crystallised sugar, which, according to Drappier, amounts to 9 per cent.

Uses. The turnip, when thoroughly boiled, becomes soft and pulpy in texture, and is then easy of digestion, although somewhat liable to produce flatulency. It forms a constituent of broths, and is often used as an agreeable accompaniment to animal food. The top shoots, such as have existed during winter, are sometimes

gathered whilst tender, and dressed as spring greens or spinach, under the name of "turnip tops." The boiled turnip is sometimes used as a poultice to ulcers and suppurating tumours; but from its not containing a sufficient body of solid matter, it is not so well adapted for the purpose as linseed-meal or loaf-bread. Several varieties of turnip are extensively cultivated for feeding sheep, oxen, &c.; and the milk of cows which are fed entirely, or nearly so, upon this root, frequently acquires a disagreeable taste, but is not otherwise injured in its qualities. A thorough boiling of the roots, before they are given to the cattle, prevents, in a great measure, this disagreeable consequence. The seeds of the plant furnish, by expression, a fixed oil named *rape or sweet oil;* but this is manufactured to a greater extent from rape or cole-seed, *brassica napus.*

CULTIVATED RADISH.

Raphanus Sativus.—Cruciferæ.—THE CABBAGE TRIBE. —There are numerous kinds of this plant cultivated in gardens, according to the form, colour, &c. of the roots; but the two principal varieties of shape are the long-rooted, which are generally used in spring, while the turnip-radishes are most common during summer and winter. The colour of the root varies from white to a rose-red, both externally and internally; its taste is generally hot, but sometimes mild; and the texture is tender when young, but fibrous or spongy when old. When boiled, they lose a considerable portion of their pungency; but they are generally eaten as a salad with salt, vinegar, &c. The young seedling-leaves are sometimes used with cress and mustard as small salad. Radish seed-pods, when plump, young, and green, are sometimes employed as a substitute for capers. This root does not contain much nutriment, and is therefore seldom used on

account of this property, but generally as a salad. It was formerly employed as an antiscorbutic, and for the cure of gravel.

WILD CABBAGE.—SEA COLEWORT.

Brassica Oleracea.—Cruciferæ.—The Cabbage Tribe. —Mr. Don states that there is scarcely an instance in the vegetable kingdom, of a plant that produces varieties so different in appearance and qualities as this plant; and if the original plant, as it is found on our shores, with very sea-green leaves, no appearance of a head, and flowering like wild mustard, be compared with the red cabbage or cauliflower, the difference is astonishing. It is a native of the English coast about the cliffs of Dover, and is found in Wales, Cornwall, and Yorkshire, is a biennial plant, the stem-leaves are much waved and variously indented and their colour is sea-green, with an occasional tinge of purple. Wild cabbage is said to be excellent in the spring; but it must be boiled in two waters to remove the salt with which it is impregnated.

The varieties of cultivated colewort or cabbage are very numerous, but the principal are the following; namely, greens, kale or borecoles, *brassica acephala;* savoy cabbage, *brassica bullata;* red and white cabbage, *brassica capitata.* Cabbage was much prized by the ancient Romans, and the Greeks held it in such high estimation, that they deduced its origin from the father of the gods. Some varieties of this plant were known to the Saxons, for they named the month of February *Sprout-kale.* The inhabitants of the north of Scotland were first made acquainted with cabbage by the soldiers of Cromwell, at Inverness.

This plant occasionally attains an enormous size; and it is stated that German cabbage sometimes grows in Holland to such a magnitude that a single head weighs forty

pounds. The juice of cabbage, according to Schrader, contains starch, vegetable albumen, resin, gum, extract, and some salts. Sir H. Davy estimates the quantity of nutritive matter in this plant at 73 in one thousand parts. According to Boussingault's calculations, 1446 parts of white cabbage are equivalent in nutritive power to 191 of wheat. In the raw state cabbage is hard, slightly bitter, and has a peculiar odour. After boiling, its odour becomes more agreeable; and the taste is sweetish and pleasant. The water in which cabbage has been boiled, or soups that contain it, runs rapidly into fermentation, particularly during summer, and emit a fetid acid odour. M. Chevreul has ascertained that sulphuretted hydrogen is disengaged during the boiling of cabbage, turnips, onions, &c., which in all probability is the source of the disagreeable odour. The same author recommends water charged with common salt for boiling such herbs, as it renders them agreeable and saccharine in taste. Long boiling, even for one or two hours, is required to give cabbage a sufficiently soft and pulpy texture; for if imperfectly cooked, as frequently occurs in this country, it is very indigestible, and liable to produce flatulency and acidity. Cabbage is much used by the peasantry of Scotland as a green vegetable, is moderately nutritive, and considered aperient. It forms a constituent of broths, and is also eaten with butter or animal food. The variety named *red cabbage* is frequently preserved in vinegar as a pickle.

SOURCROUTE is prepared from cabbage, a species of aliment which in Germany is reckoned powerfully antiscorbutic. It is made by putting alternately a layer of cabbage, cut into thin slices, and one of salt, with a few carraway seeds or juniper berries. A kind of acid fermentation is generated, and fetid water flows from the vessel, but the brine is renewed till the twelfth day, when

the liquid becomes clear. This article must be kept in vessels well closed, and covered with brine. It is eaten with animal food, particularly pork. It was celebrated at one period for preserving sailors from scurvy during long voyages; but it is now ascertained that a proper mixture of other green vegetables with animal food, answers the same purpose.

CAULIFLOWER AND BROCOLI.

Brassica Botrytis.—Cruciferæ.—THE CABBAGE TRIBE.—This is one of the most delicate plants of the cabbage tribe, and was originally imported from the isle of Cyprus about the middle of the sixteenth century. It was not, however, much cultivated till about the end of the seventeenth century. The flower buds of the plant form a close firm cluster or head, and the perfection of this part is chiefly attended to in its cultivation.

BROCOLI can scarcely be distinguished from cauliflower; the stem is generally taller and the leaves more elongated, but numerous varieties of both exist, and new kinds are continually coming into notice.

USES. Cauliflower and brocoli are softer in texture and more digestible than cabbage, and are generally favourites in this country. They are usually boiled in water, and eaten with animal food, butter, &c.; but in France they are cooked with various sauces.

Dr. Johnson must have had a superlative opinion of this herb, for he thus expressed himself: "Of all the flowers in the garden I like the cauliflower."

SEA KALE.—SEA CABBAGE.

Crambe Maritima.—Cruciferæ.—THE CABBAGE TRIBE.—Sea kale is a native of Britain, France, Sweden, the coast of the Mediterranean, and grows in the sand on the sea shore. The whole plant is smooth, covered with a

very fine farina, and has a sea-green colour. Its radical leaves are large and sinuated, its flowers white, and they smell strongly of honey. It was first introduced into gardens about the middle of last century, and blanched by a cover of sand, litter, earthen pots, &c. It is now pretty generally cultivated and forced in gardens like asparagus. In the wild state the young spring shoots, and the stalks of the unfolded leaves, blanched by rising through the ground, are frequently used. The ribs of the large leaves are sometimes dressed as asparagus. In its properties it is similar, and is by many considered not inferior to asparagus. It is eaten with butter, and forms an excellent addition to soups, but requires long-continued boiling before it is sufficiently softened in texture. By forcing, it may be had in perfection from November till May.

GARDEN CRESS.

Lepidium Sativum.—Cruciferæ.—THE CABBAGE TRIBE. —This plant is a native of Persia and the island of Cyprus, and is found in corn fields. It is cultivated in gardens, and grows very rapidly. Its taste is warm and pungent, and when young is the most agreeable and digestible of small salads. It seems to act as a condiment in assisting digestion, is less liable to produce flatulency than many other green vegetables, and in this respect is well suited for those who have weak digestive organs. Other species of cress, such as the *sisymbrium nasturtium* or water cress, &c., possess similar properties.

ARTICHOKE.

Cynara Scolymus.—Cynarocephalæ.—The artichoke has been cultivated in England since the reign of Henry VIII., and is a common plant in the gardens of this country. The flower head, in an immature state, contains the part generally used as aliment, which is the bottom freed from

bristles and down, and the lower leaves of the calyx. The taste of this part of the plant is somewhat sweet and mucilaginous, but the leaves are bitter. It is considered moderately nutritive and digestible, but requires boiling for two or three hours to soften its texture, Artichokes are generally eaten with butter, but are also added to soups, pies, &c. They may be dried and preserved for winter use, and when young are sometimes used as salad, with vinegar, salt, oil, &c.

CHICORY OR SUCCORY—ENDIVE.

Cichoreum Intybus et C. Endivia.—Cichoraceæ.—Chicory was known to the Romans as a pot-herb and salad ; and Horace notices this plant under the name of *cicorea*. It grows abundantly by road sides, and is cultivated in Belgium, Holland, and Germany. Its leaves have a bitter taste, which is much diminished by cultivation, and when blanched are sometimes used as salad. It is eaten by sheep and goats, but refused by horses and cows. It is employed in affections of the stomach on the Continent, but not often in this country. Gerarde the English herbalist informs us that "the leaves of chicory are boiled in pot-age or broths for sicke and feeble persons, that have hot, weak, and feeble stomachs, to strengthen the same."

The root of this plant is spindle-shaped, and contains extractive, colouring matter, albumen, sugar, woody fibre, and salts. It is frequently employed as a substitute for coffee or for its adulteration, and has been used in Holland, Flanders, &c., for a good many years; more particularly since the Continental wars, during which period coffee attained a high price. In preparing it for this purpose, it is first dried, then roasted and ground; but its infusion wants the agreeable aroma of coffee and is more bitter.

ENDIVE—is another species of chicory, and a native of the East Indies. It was introduced into this country in

1548, is a hardy annual, requires a rich soil to secure its rapid maturity, and is blanched by tying up the leaves when it has attained its full growth. It generally possesses some degree of bitterness, but some varieties have very little of this quality. It is used as a salad, ragout, or as a constituent of soups, &c.; and is considered very digestible and well adapted as a green vegetable for those who have delicate digestive organs.

GARDEN LETTUCE.

Lactuca Sativa.—Cichoraceæ.—The cultivated lettuce was introduced into Britain in 1562, but from what country is not known. The ancients, however, were acquainted with this vegetable, and in the days of Herodotus it was employed as a pot herb. The emperor Augustus was believed to be cured with it of some dangerous illness, from which circumstance it acquired great celebrity; and Galen in his old age ate every night of lettuce, in order to obtain a tranquil sleep. There are numerous varieties of this plant, and its taste when young is bland, mucilaginous and insipid; but after the flower stalks shoot up, it becomes bitter, and contains a milky narcotic juice. Attention to this change of qualities during its progress to maturity, will reconcile the seemingly contradictory statement, that lettuce may be eaten in large quantities with impunity, and yet that a medicine of great efficacy and poisonous properties may be extracted from it. When used as aliment, it should be young; but when employed for medical purposes the plant ought to be in full flower.

Uses. Lettuce does not contain much nutriment, but is by many considered the best vegetable of the salad kind, and it is easily digested, and perhaps slightly aperient. On account of its insipidity it is eaten with salt, sugar, vinegar, oil, &c. The medicine named *lactu-*

carium is procured from the flower stem of the lettuce by making incisions in it, and collecting the milky juice which flows out. It resembles opium in appearance and effects, although much less poisonous and certain in its operation. It is useful as a palliative in pulmonary consumption and chronic catarrh.

CELERY.

Apium Graveolens.—Umbelliferæ.—The Umbelliferous Tribe.—This biennial plant is a native of Europe and South America, and is a common weed in some parts of this country, in marshy ground near the sea. In its wild state it is called *smallage*, and is very acrid, having a coarse taste and odour. The effects of cultivation upon it are very remarkable, for the leaves of celery are mild and sweetish in taste. The blanched leaf-stalks are used as salad, but are also stewed and put into soups, to which they communicate the peculiar flavour of the herb. In Italy, both the blanched and unblanched leaves as well as the seeds, enter into the composition of soups. The root of a variety, named ceteriac, is also used as a constituent of soups, and in Germany this part of the plant boiled is used as a salad, with oil and vinegar. Celery contains, according to Vogel, fixed oil, a volatile oil the source of the plant's odour, sulphur, mannite, bassorine, gum, extractive and salts.

It does not contain much nutriment, but when blanched is very digestible and forms an excellent salad. It is considered a good antiscorbutic.

PARSLEY.

Apium Petroselinum.—Umbelliferæ.—The Umbelliferous Tribe.—This biennial plant is a native of Sardinia, Greece, Turkey, &c., has been cultivated in Britain since 1548, and is found in every kitchen garden. It is

now so common as to be naturalised in several places, both in England and Scotland. It contains an essential oil, which is the source of its peculiar odour, and when distilled it furnishes an aromatic water, which was formerly used in medicine. The curled-leaved variety is most frequently cultivated; but the carrot-rooted kind is also reared on account of its roots, which are used like parsnips during winter. Parsley is used as a pot-herb, but is also employed for ornamenting dishes. It is apt to produce flatulency, but when thoroughly boiled is moderately digestible. It is considered diuretic and is a popular remedy for gravel.

SPINACH OR SPINAGE.

Spinacea Oleracea.—Chenopodeæ.—The Goose-Foot Tribe.—This is an annual plant which has been cultivated in our gardens since 1568. Its native country is not known, but some authors state that it came from Asia. It is a very useful and hardy vegetable, and grows both during winter and summer, in any light sandy soil. It contains a great quantity of colouring matter, and tinges green the excrementitious matters. It is very tender in texture, and is on that account more easily digested than many other green vegetables, and is generally considered laxative and diuretic. It is cooked generally by boiling, and afterwards mixed with butter, with the addition of spices, sugar, &c., to qualify its insipidity. The addition of much butter, such as a third of its weight, as recommended by some authors, must render it very indigestible. It is used as a salad in some countries, and by cooks to communicate a green colour to soups and articles of confectionary.

SORREL.

Rumex Acetosa.—Polygoneæ.—The Buck-Wheat Tribe.—Sorrel is a perennial plant, a native of Britain,

and is frequently cultivated in gardens. Its taste is acid, and it contains a large quantity of the superoxalate of potass or salt of sorrel, which was, at one period, extracted from this vegetable. Besides this salt, it contains tartaric acid, starch and mucilage. When boiled in water it loses much of its acidity, and becomes cooling to the taste, tender and agreeable. It is considered laxative and is sometimes added to soups. It is employed to a great extent in France; and Majendie as well as other authors state that they have known cases of gravel and stone produced by the excessive use of this vegetable, the calculi or stones being composed of oxalate of lime. A decoction of it is sometimes used as a drink during fevers and inflammatory diseases. The natives of Lapland boil large quantities of the leaves in water, and then mix the decoction with rein-deer's milk, and use this as an agreeable aliment.

ASPARAGUS.

Asparagus Officinalis.—*Asphodeleæ.*—The Asphodel Tribe.—The ancients applied the term asparagus to all the young shoots of alimentary plants; but it is now restricted to this plant, which is a native of Britain, France, &c., and is generally cultivated in gardens. It is reared by forcing in beds, and two crops in the year may be obtained. According to Vauquelin and Robiquet, the juice of asparagus contains albumen, a saccharine principle, malic acid, salts, and a peculiar crystalline body called *asparamide*, which is colourless, having no odour and little taste.

Uses. The quantity of nutritive matter in this plant has not been determined; but it is generally considered wholesome, and, as a green vegetable, nutritive and digestible. It has been accused of causing gout, hemorrhage, &c.; but there are no sufficient grounds for be-

lieving such opinions. It has, however, a peculiar effect on the urinary secretion, which is rendered fetid by its use as aliment. It is sometimes employed as a constituent of soups; but is more frequently sent to table with toasted bread, and eaten with butter. It is considered diuretic and aperient, and is used in France for the cure of diseases, particularly the root. A vinous liquor may be prepared from the fruit or red berry by fermentation.

COMMON GARLIC.

Allium Sativum.—*Asphodeleæ.*—THE ASPHODEL TRIBE.—Garlic is a native of Sicily and the south of France, and has been cultivated in this country since the year 1548. It is a perennial plant, and the bulb of this species is composed of several oblong subordinate bulbs, which have been named *cloves*, of a pale colour internally, but sometimes tinged with purple on the outside. These small bulbs are enclosed in a membranous bag, from which proceed long fibrous roots, and each clove, when planted, attains in one season the size of the parent bulb. The bulbs are dug up in autumn, cleaned, tied together, and generally hung from the roof of an airy apartment. If this or some similar mode of management be not observed, they soon spoil and lose their strength. According to Dr. T. Thomson, garlic, when dried, loses about two-thirds of its weight. All the parts of this plant, particularly the bulbs, have a strong pungent odour, and an acrimonious biting taste. The bulbs furnish, by expression, a considerable quantity of clear juice, which, when distilled with water, produces an essential oil, of a yellow colour, an acrid taste, a penetrating odour, and, when applied to the skin, causes blistering. Garlic contains, besides the essential oil, which is the active ingredient, mucilage, albumen, fibrous matter,

sugar, sulphur, salts, and water. When garlic is boiled in water, it loses almost all its pungency, from the evaporation of the oil, and may be eaten in this state with impunity; but it is rarely used as aliment. It is generally disliked in this country on account of its disagreeable odour, &c.; but is sometimes used as a condiment or stimulant along with animal food, or as a component part of some sauces. It was much used by the ancient physicians, in the form of poultice applied to the soles of the feet, or calves of the legs, in typhus fever, small-pox, &c. This cataplasm, which is sometimes useful, may be made by beating the bulbs to a pulp in a mortar. The juice of garlic is also a popular remedy for deafness, a few drops being occasionally put into the affected ear. It has also been used internally for the cure of asthma, and for the expulsion of worms.

Allium Ascalonicum or *Shallot*, and *Allium Scorodoprasum* or *Rocambole*, possess properties similar to garlic.

THE ONION.

Allium Cepa.—Asphodeleæ.—THE ASPHODEL TRIBE.—The native country of the onion, and its introduction into Britain, are not known: but it, as well as the leek, was cultivated by the Israelites; for the latter regretted their departure from Egypt, on account of their loss of these as well as other luxuries. This plant is still in high estimation in that country, for the modern inhabitants believe that it will be met in the garden of paradise, and will be the food of houris and true believers. This plant is biennial, and resembles garlic; but its root or bulb is tunicated or formed of concentric circles. There are several varieties cultivated besides the common onion, namely, the Spanish, Portuguese, Egyptian, scallion, tree-onion, &c.; all of which possess very similar

properties. All the parts of this plant, but especially the bulbs, have a strong penetrating odour, which affects the eyes powerfully, accompanied with an acrid but slightly saccharine taste. This acridity is almost totally dissipated by boiling, and then the onion is chiefly characterised by its saccharine and mucilaginous qualities. According to Fourcroy and Vauquelin, the bulbs contain a volatile oil of an acrid nature, holding sulphur in solution, a matter analogous to gluten, a considerable quantity of uncrystallisable sugar, mucilage, acids, and salts.

Uses. Onions, when full-grown, and used in the raw state, are acrid and very liable to produce flatulency and disagreeable eructations; but are somewhat more digestible when young. When boiled, their essential oil or active principle is dissipated by the heat, and they are then rendered tender, pulpy, slightly stimulating, nutritive, and digestible, if taken to a moderate amount. A roasted onion is a popular application to a suppurating swelling, and is sometimes applied to the ear for the cure of ear-ache, or when matter is supposed to be forming in that organ.

THE LEEK.

Allium Porrum.—Asphodeleæ.—The Asphodel Tribe. —The leek is a native of Switzerland, and is supposed to have been in cultivation about the year 1562. It is a biennial plant, and its bulbs are white, globose, and consist of concentric circles, seated on a radical plate, from which spring fibrous roots. The leek possesses properties similar to garlic and onions, but is less acrimonious. Its active properties reside in an essential oil, which is dissipated by boiling. It is used as an ingredient of soups, and, when sufficiently boiled, is soft, tender, agreeable to many people, moderately digestible, and nutritive.

THE CHESTNUT.

Castanea Vulgaris.—Cupuliferæ.—THE OAK TRIBE.—This large and beautiful tree is a native of Asia Minor; but is cultivated in the temperate regions of Europe. It is one of the ornaments of our forests, sometimes attains a great age, and grows to an immense thickness. The fruit or nuts are large, ovate, generally two in number and attached to the greatly enlarged outer calyx, which is covered with sharp prickles. The calyx or husk separates from the nuts about the end of September, and the latter are afterwards dried in the sun for several days. The taste of the kernel is sweet, farinaceous, and pleasant. It contains a large proportion of starch and sugar, and little or no oil; but it has not been thoroughly analysed.

USES. Chestnuts are very indigestible in the raw state, causing pain, flatulency, and other symptoms of deranged digestion; but, when roasted, boiled, or cooked with steam, they are nutritive and more easily assimilated, although even in this state they can be eaten in quantity only by robust individuals. They are used extensively as food in some of the mountainous districts of Italy and France; and the inhabitants make the chestnut-meal into *pottage* with milk or water, and also form it into cakes. They are generally used in this country as a dessert; but they also enter into the composition of soups, are eaten with turkey or other fowls, and are manufactured into various alimentary shapes by persons skilled in the art of cookery. The wood of the chestnut-tree is used for many purposes in the arts, is hard and durable, but greatly inferior to that of the oak.

HAZEL-NUT AND FILBERT.

Corylus Avellana.—Cupuliferæ.—THE OAK TRIBE.—The hazel is a native of all the temperate countries in

Europe and Asia. It is mentioned in the Bible as having been used by Jacob, and Virgil also alludes to it as being injurious to the vines on account of its spreading roots. This is a large shrub with numerous stems, and it has many varieties. The cultivated hazels are of two kinds, namely, nuts and filberts; the former being distinguished by the shortness of their calyces or husks, and the latter by their length. The nut consists of a hard shell, which contains a roundish-ovate kernel, covered with a brown shining pellicle. The taste of the kernel is sweet, farinaceous, agreeable, and affords, by expression, about half its weight of a fixed oil, called *nut-oil*. This is sweet, destitute of odour, has little colour, and is frequently employed, on account of the two latter properties, in the preparation of perfumed oils.

Uses. Hazel-nuts, on account of the large quantity of oil and starch they contain, are very nutritive, but difficult of digestion, and are liable to produce flatulency, rancidity, or pain in the stomach. Filberts contain less oil in their composition than hazel-nuts, and on this account ought to be preferred by those who have delicate digestive organs. The hazel-nut is extensively produced in England, but the kinds imported from Spain are generally preferred. Filberts intended for long preservation should "remain on the tree till thoroughly ripe; they should then be laid on a dry floor for a few days, and afterwards stored in jars of dry sand." Hazel-wands were believed, during the dark ages, to possess extraordinary powers in divination, and in discovering hidden treasures, &c. The wood is employed in cabinet-making, veneering, &c.; and the root-shoots are used in the manufacture of fishing-rods, crates, hoops, &c. Faggots of hazel are used for heating ovens. The charcoal of the wood is light, and employed in drawing, the manufacture of gunpowder, &c.

THE WALNUT.

Juglans Regia.—*Juglandeæ.*—THE WALNUT TRIBE.—The walnut-tree is a native of Persia and the north of China. It was known to the Greeks, who named it *Persicon* and *Basilicon*, Persian or royal nut. It is a large and lofty tree, having strong spreading branches, and attaining a great age. The bark is thick, and furrowed on the trunk; the leaves, when bruised, exhale a strong aromatic odour, and during the extreme heat of summer, their exhalations are said to cause unpleasant feelings in persons who sleep under the tree. The fruit is roundish-oval, of a green colour, about one and a half inches long, and contains a nut. Towards autumn the husk softens and decays, while the nut, being freed from its attachments, falls out. The shell of the nut is channelled, and, in most of the cultivated varieties, so thin that it may be crushed with the fingers. The kernel is covered with a fine pellicle, and separated by a thin partition which may be readily removed, has a whitish colour, and is irregularly lobed. Its taste is sweetish, rich, agreeable, and it contains a large quantity of oil. This is a *drying oil*, being convertible into a varnish by exposure to the air, and amounts to about one-half of the weight of the kernel.

USES. Walnuts are very nutritious, but difficult of digestion, on account of the large quantity of their contained oil. Those who are troubled with derangement of the stomach should use them with extreme moderation, or perhaps avoid them altogether; particularly if they have begun to decay, as in this state they are more apt to excite a rancid digestion. They are used to a much greater extent in Italy, France and Switzerland, than in this country; and the roads in some of these regions are lined, for many miles together, with walnut-

trees. Walnuts are also used as a pickle, and are preserved, for this purpose, about the end of June. In France, they are eaten during August, before the shells become hard, with vinegar, salt, pepper, and shallots. A species of ketchup is also made from the green fruit. The most general employment of the walnut, in the south of Europe, is for the expression of the oil which it contains. This oil is used by artists in mixing white or delicate colours, as a substitute for olive-oil at table, or oil of almonds in medicine, and for burning in lamps. It is consumed to a considerable extent in France, and the *marc* or husks which remain after the expression, are used to feed swine, sheep, and poultry. The sap of the tree is very sweet, and contains sugar. Incisions are frequently made into the trunk during spring, and a clear sap flows out, yielding, on evaporation, a kind of extract which is used as sugar, and sometimes a kind of wine or spirit is made by fermenting it. The roots, the bark of the root, the husks, &c. of the walnut-tree yield to water a dark-brown dye, which becomes fixed in wood, hair, and wool, without alum or any other mordant. This dye is used by gypsies and theatrical performers for staining the skin, and by cabinet-makers for producing a similar effect on white and yellow wood. The wood of the walnut-tree is considered very beautiful, and is not liable to crack or twist. It is used by cabinet-makers and coach-makers, and in the manufacture of arms and musical instruments. The bark and external covering of the fruit were at one period employed as stomachics, for the expulsion of worms, &c.

THE CASHEW NUT.

Anacardium Occidentale.—Anacardiaceæ.—The Cashew Tribe.—This tree is a native of the East and West India islands, and South America, and is believed to have

been known to the Greeks and Arabians. It commonly attains the height of from twelve to sixteen feet, and the fruit consists of a kidney-shaped nut, seated on a fleshy, pear-shaped peduncle, or what Mr. Don calls a nut seated on a fruit. The fruit or peduncle, which has a yellow or red colour and an acid taste along with some astringency, is sometimes made into a preserve with sugar. Its juice is converted into a species of wine, and an ardent spirit is distilled from the latter product. The nut has two shells. The external shell is smooth, ash-coloured, and between it and the internal one, which covers the kernel, there is a thick, oily, dark-coloured fluid, which is inflammable and very caustic when applied to the skin. The kernel is white, sweet, agreeable, contains oil, and abounds with a milky juice.

Uses. The cashew nut is very nutritious, but like other oily nuts, difficult of digestion. It is generally roasted, so as to deprive it of its hard and unwholesome covering. It forms an ingredient in the composition of puddings, and is sometimes used to improve the flavour of old Madeira wines. The oily liquid which is contained between the two shells is used as an application to cancerous and syphilitic ulcers, in the countries where the tree is indigenous. This juice when mixed with lime is also used to form an indelible ink. The tree yields a gum which resembles gum arabic.

CACAO.—CHOCOLATE.

Theobroma Cacao.—Byttneriaceæ.—The Cacao Tribe.—The cacao-tree is a native of South America, from twelve to sixteen feet in height, and many countries are celebrated for its cultivation, particularly Trinidad, the Carraccas, &c. The fruit is large, about three inches in diameter, has somewhat the shape of a small cucumber, of a red or yellow colour, and contains a pulp in which

are imbedded the seeds or nuts. The pulp is slightly acid to the taste, and is sometimes sucked or eaten by the natives of the countries where the tree is cultivated. The seeds are ovoid in shape, a little larger than hazel nuts, and of a reddish-brown colour; there are about twenty-five in each capsule, and they speedily lose their power of vegetation when removed from it.

The fruit, as it ripens, is gathered by the hand or by means of a forked stick. On the continent the pods are buried in the earth for thirty or forty days, in order that the mucilaginous matter surrounding the seeds may be decomposed by fermentation; and also for the purpose of destroying their power of vegetation. In the West India islands, the pods are collected into a heap, and allowed to ferment for three or four days, with a similar object; but it is stated that this method is liable to give the cacao a bad colour and an acrid taste. The cacao nut contains about four-tenths of its weight of a fixed oil, which is solid at ordinary temperatures, and named in France *beurre de cacao*. It has the consistence of tallow, a yellowish-white colour, the odour of the roasted nut, and is little liable to become rancid. It is manufactured by first roasting the nuts, bruising them into a fine paste, and finally submitting them to strong pressure between heated iron plates. It is used in France for affections of the chest, combined with syrup, gum, &c. It is also employed as an ointment for chops, hemorrhoids, and in the formation of suppositories, for the relief of constipation dependent on spasmodic stricture of the rectum.

CHOCOLATE is prepared by first slightly roasting the nuts, removing the shells, and then grinding the kernel to powder in a mill or mortar. The powder is afterwards reduced to a smooth paste between rollers driven by machinery, then heated and put into tin pans. Aromatics of various kinds, and other substances, such as

vanilla, cinnamon, anise, long pepper, sugar, musk, annotto, are mixed with the paste during the levigation according to the fancy of the manufacturer. Mr. Donovan states that "he who wishes to have pure chocolate without being drugged, has no more to do than purchase the scorched nuts, and to grind them in a coffee-mill, without having removed the shells. The fine smell of this, when newly ground, gives evidence of its superiority, and its taste when brought to table will complete the proof." The cacao used in the West Indies, and on board of ships, is generally prepared by this simple and certainly superior method.

Chocolate is sometimes adulterated with starch or flour, and it is stated by some authors, that this sophistication cannot be detected, for the cacao nut contains about ten per cent. of starch. Delcher and Chevallier have shown that this nut contains no starch, and that the test of iodine may be depended on; for when added to genuine chocolate, it does not strike a blue colour in the liquid, but only a yellowish brown tint.*

Uses. Chocolate or roasted cacao is frequently used as a nutritive and agreeable diluent, particularly at breakfast, being made into an emulsion with sugar and milk. It is difficult of digestion, and frequently disagrees with those who have delicate digestive organs, although instances occasionally occur where it is more suitable than either tea or coffee. The roasted shell is also employed in the manufacture of a similar beverage, which has a pleasant flavour, but is slightly astringent.

Cocoa or Coco is a name applied to a preparation rather extensively used; and is said to be manufactured from the seed-coats of the cacao-nut, mixed with the kernel, or by grinding the roasted nuts without the re-

* Journ. de Chimie Medicale, Oct. 1838.

moval of the shell. It is more astringent than chocolate, but in other respects is similar in properties.

THE COCOA-NUT.

Cocos Nucifera.—Palmaceæ.—THE PALM TRIBE.—According to Mr. Henry Marshall, the cocoa-nut tree is one of the most interesting of the family of palms in the variety and utility of its products. It is found in inter-tropical Asia, Australia, America, and Africa; but it does not arrive at perfection unless the mean temperature be about 72° Fahr. It grows to the height of from 60 to 110 feet, and generally attains the thickness of from 1 to 2 feet. From the structure of the tree, there are no branches, but the stem is encircled with parallel rings, being the marks of the leaves which annually fall away. The stem is erect, and crowned with a tuft of leaves, which are twelve or fourteen feet long. The tree continues to yield fruit for sixty or seventy years, and in good seasons, when the soil is moist, it blossoms every four or five weeks. There are thus generally both flowers and fruit to be found at the same period, and a good tree will yield from eighty to one hundred nuts annually. The fruit is round or ovate, slightly triangular, sometimes as large as a man's head. It is composed of an external covering, which is thin and dry, under which is found a fibrous matter, then a nut of great hardness. Under the shell there is a white kernel, hard and sweet to the taste, and somewhat resembling the hazel nut in these properties. In the centre of the kernel there is a cavity containing a milky coloured fluid, of a sweetish-saline taste, and which contains sugar, gum, albumen, &c. The pulpy matter or kernel, according to Brandes, contains a crystalline fatty matter (cocoa-nut oil) albumen, gluten, sugar, salts, and a large proportion of water.

Uses. The kernel of the cocoa-nut is very nutritive, and is used as ordinary food by the natives of many regions of the earth. It is, however, somewhat difficult of digestion, from the large proportion of its contained oil, and also from its hard texture; civilised nations therefore rarely use it but as a dessert. It is eaten alone or seasoned with pepper and vinegar, but is sometimes added to cakes. The flower yields a rich saccharine juice, which is converted into a species of sugar, or arrack is made from it. This liquid, which is called "toddy," is also drawn from other species of palm-trees; and it is stated that about one-eighth part of proof-spirit can be procured from it. The oily fluid used in the preparation of *curry*, is procured from the cocoa-nut by expression; and large quantities of the oil are manufactured for exportation. It is used universally in Ceylon for burning in lamps, in Britain for the manufacture of soap; and when the fluid is separated from the solid part, the latter is made into candles. These candles are hard, less greasy, and burn longer than those made from tallow, and have some resemblance to wax candles. The other products of this valuable tree are used for a variety of economical purposes. The slender roots are made into baskets, the woody shell of the stem and the leaves are employed in the construction and thatching of huts. The leaves form a considerable portion of the food of domesticated elephants, and these animals display much sagacity in separating the thin part of the leaf from the woody fibre. The fibrous part of the fruit is used in the manufacture of yarns, cordage (*coir*), mattresses, saddles, cushions, mats, &c. The cordage is smooth, pliable, strong, elastic, and is much used on the Indian ocean. Sago is sometimes prepared from the cellular substance of the stem.

THE DATE.

Phœnix Dactylifera.—Palmaceæ.—The Palm Tribe.—This beautiful palm is a native of India, Arabia, and Northern Africa, and has been known from time immemorial; but it is now cultivated in South America, Portugal, Spain, Italy, &c. This tree attains the height of about fifty feet; the trunk is generally from one to one and a half feet in diameter, and it is invested by an enormous *bouquet* or crown of very long leaves, which gives it a very picturesque appearance. There are many varieties of dates, and some are as large as a pomegranate; but they are generally about the size of a pigeon's egg, ovoid, elongated, and are covered with a thin pellicle, of a reddish-yellow colour, which contains a rich, saccharine, and granulated pulp. The pulp encloses a hard nut, which may be softened by the heat of boiling water, and is then given as food to horses, goats, &c. Wild dates have a harsh unpleasant taste; but the cultivated varieties are saccharine, mucilaginous, and agreeable. Dates are collected before they are completely ripe, and are dried by the heat of the sun or by that of an oven. This country is chiefly supplied with them from Egypt and Barbary.

Uses. This fruit contains a large quantity of sugar and gum, but little acid; it is therefore very nutritive, and the natives of some Asiatic and African countries use it as a chief part of their food. Dates are only used as a dessert fruit in this country, and though rich, are not particularly difficult of digestion when of good quality.

They are used in the form of decoctions, along with figs and raisins, for affections of the chest and urinary organs. By fermentation with water, they furnish a spirituous liquor; and a species of vinegar is also made from them, which is much used in Upper Egypt. The trunk of the tree is considered excellent wood for carpentry-work, and

the leaf stalks are used in the formation of mats, cords, sacks, &c. This palm was held by the ancients as the symbol of victory, being the reward of the victor; and it figured in all the processions of the Jews.

THE PLANTAIN.

Musa Paradisiaca.—Musaceæ.—The Banana Tribe.—The plantain grows very abundantly between the tropics, in Asia, America and Africa. It is cultivated in the green-houses of Europe, chiefly for the beauty of its foliage. Its fruit is a kind of fleshy succulent berry, without grains, the pulp is saccharine in taste, and is said to resemble that of certain kinds of pears. There are numerous varieties which differ from one another in size, colour, form, odour, &c.; but the most common are from six to twelve inches long, and one inch or more in diameter, a little curved, and have some resemblance to small cucumbers. The skin covering them is rather thick, smooth and green, but becomes yellow and sometimes black when ripe. Before maturity, they are covered with an envelope, and sometimes this contains fifty or more berries. One tree is considered capable of nourishing a family for one month, and as their production is constantly going on, they are found ripe throughout the whole year. The fruit contains sugar, gum, albumen, woody fibre and several acids.

Uses. This fruit is considered a wholesome, agreeable, but rather flatulent aliment, and is generally eaten when ripe, but when not arrived at maturity it is cooked as turnips, with flesh, fish, &c. It is also roasted and seasoned with sugar, orange-juice, &c. It is dried in the sun or by the heat of a stove, in order to preserve it for future use, and the negroes make pastes, &c. of it, to serve as food during long journeys. According to Humboldt, the plantain is an exceedingly valuable tree where it is

cultivated, and more productive than the potato. Dr. Wright states that it is of more importance for the sustenance of the negro in Jamaica than even bread or flour.

THE BANANA.

Musa Sapientum.—Musaceæ.—THE BANANA TRIBE.—This tree is also known by the name of Indian fig, and is by some authors considered a variety of the plantain. It grows in the same places as the plantain, but its fruit is smaller, more numerous, saccharine, delicate and in higher estimation. The pulp has some resemblance to that of the fig, and crystallisable sugar can be procured from it; but it does not contain so much nutriment as the fruit of the plantain. It is capable of fermentation, and an alcoholic spirit is prepared from it. This fruit is considered useful in affections of the chest, urinary organs, and in the cure of agues. It is occasionally cultivated in green-houses, chiefly for the beauty of its foliage.

THE BREAD-FRUIT.

Artocarpus Incisa.—Artocarpeæ.—THE BREAD-FRUIT TRIBE.—This tree is about the size of a common oak, and grows abundantly in the South Sea islands. Its fruit is about nine inches long, globular or heart-shaped, and of a greenish colour. The pulp is white and fibrous, and becomes succulent and yellowish as it approaches to maturity. It contains a large quantity of starch, from which bread may be made. As it can only be preserved for a short time when thoroughly ripe, it is more generally used a little before this period; and after being divided into three or four parts, it is cooked by roasting. Its taste, when roasted, is said to resemble a mixture of wheaten bread and Jerusalem artichoke. The natives of the South Sea islands prepare a kind of acid conserve from the ripe fruit, which they use as aliment when the

tree is not in season. Its season continues for about eight months, and three trees are believed to be sufficient for the nourishment of one man. The bark of the tree being beaten and otherwise prepared, is manufactured into a kind of tissue for clothing the natives.

THE FIG.

Ficus Carica.—Artocarpeæ.—The Bread-fruit Tribe.—The fig-tree is a native of the west of Asia and the shores of the Mediterranean. It has been cultivated from time immemorial, and is believed by some authors to have been the first fruit eaten by man. It is frequently mentioned in the Bible, was highly esteemed by the Jews, and the want of blossoms on the fig-tree was considered by them as a grievous calamity. The Spartans, in the time of Lycurgus, used figs as a part of their ordinary food; and the Athenians were so much attached to this fruit that its exportation was prohibited. The fig-tree is cultivated to a considerable extent in the Levant, France, Spain, Italy, &c., and even in Britain it often produces fine fruit, particularly if trained against a wall. There are numerous varieties of the cultivated fig; and as the fruit of the wild kinds is very inferior in flavour, it is employed, when it falls from the tree before maturity, to impregnate the female blossoms of the cultivated fig. A similar process is effected by an insect named *cynips psenes*, which conveys the pollen from the wild fig to the cultivated kinds, at the time it deposits its eggs. This process is called *caprification*, and the ripening of the fruit is much promoted by it. The fig-tree rarely exceeds fifteen feet in height, is branched from the bottom, and its leaves and bark contain an acrid milky juice, of which caoutchouc is a constituent. The fruit is solitary on a thick short stalk, of a pyriform or globular shape, having a purplish or red-

dish colour, and the pulp is fleshy, soft, fragrant, and saccharine. The finest figs are small, and of a whitish colour. Britain is chiefly supplied with dried figs from Turkey.

Uses. This fruit contains a large quantity of saccharine matter, is very nutritive, and slightly aperient; but is apt, when eaten in large quantities, to cause indigestion. Figs are used, however, as a principal article of food in Eastern countries, as well as in Italy and Spain. They enter into the composition of some decoctions and laxative confections, and are used externally as poultices in the raw and roasted states to promote suppuration. It is stated in Isaiah that king Hezekiah used the fig as an application to a boil. In France the wood of the fig-tree, which is light and soft, is used to make whetstones, because it readily retains emery.

THE MULBERRY.

Morus Nigra. — *Artocarpeæ.* — The Bread-fruit Tribe.—The mulberry-tree is a native of Persia and Italy, and has been known from a very remote period. It is mentioned in the book of Samuel, and also in the Psalms. Ovid has celebrated the black mulberry-tree in the story of Pyramus and Thisbe. It was first brought into England in the year 1548; and the royal edict of James I., about 1605, offering mulberry-seeds to all who would sow them, brought this tree into fashionable cultivation. It is generally a low branchy tree, having a thick rough bark and broad heart-shaped leaves. It is often dwarfish in Britain, spreading into thick branches near the ground, and having a large head. It frequently, however, attains the height of twenty or thirty feet, is remarkable for the slowness of its growth, and lateness in sending forth its leaves, although its fruit comes early to maturity. It attains a considerable age, some

trees being three hundred years old, and its roots possess great tenacity of life. The fruit is a large succulent berry, composed of a number of smaller berries, each containing a single seed. It is destitute of odour, the taste is sweet and acidulous, and it contains a violet-red coloured juice, which is composed of sugar, tartaric acid, vegetable jelly, vegetable fibre, &c.

Uses. The mulberry is cooling and aperient, and is sometimes eaten as a dessert-fruit. It forms an agreeable preserve, though not generally used for that purpose. The juice is occasionally added to cyder, to which it communicates a pleasant taste and odour. It is also added to some domestic wines as a flavouring ingredient. Some of the Greeks in the Crimea distil a weak and agreeable spirit from it, and a wine is made from it in France; but the latter is very liable to become acid. Syrup of mulberries is used as a gargle in inflammation of the throat, and the root has been employed in cases of tape-worm. The leaves are used to feed the silk-worm; but those of the *morus alba*, it is said, are best adapted for producing a fine silk. Cattle eat the leaves, and all kinds of poultry are fond of the fruit.

THE VINE.

Vitis Vinifera.—Viniferæ.—The Vine Tribe.—The vine must have been known from the most remote antiquity, for it is recorded in the Bible that Noah, after coming out of the ark, planted a vineyard and drank of the wine. According to Humboldt, it is indigenous in Armenia, Georgia, and on the coasts of the Caspian sea. Dr. Sickler supposes that the vine came originally from Persia, and from thence was carried into Egypt, Greece, and Sicily; while, from this latter country, it passed into Italy, Spain, France, &c. Mr. Burnet states that the vine which is found wild in America is very different

from the *vitis vinifera*, and therefore it is an error to suppose the grape common to both continents. The grape does not grow in very cold regions; and when the heat is great, the fruit is seldom good. In the old world the vine is cultivated from the 21st to the 51st degree of northern latitude, or from Schiraz in Persia to Coblentz on the Rhine. According to some authorities, it was introduced into Britain by the Romans; and there is reason to believe that vineyards were common in England during the dark ages, and formed general appendages to monasteries and abbeys.

It is impossible to determine whether the cultivation of the vine in this country, for the manufacture of wine, has been given up on account of its not affording a profitable return, or from some unfavourable change in the climate; but it rarely produces fine fruit, except in vineries or hothouses. By forcing, however, with artificial heat, excellent grapes can be had in some vineries during every month of the year; and in the London market they are found in the highest perfection from March to January. The vine attains a very great age, and is almost equal in longevity to the oak. Pliny gives an account of a vine which was 600 years old; and Miller states that a vineyard 100 years old is reckoned young. The extent of its branches also bears a proportion to its age; and there is a record of one at Northallerton in England that covered a space of 137 yards. The height of the vine is also very great, and sometimes it is found overtopping the highest trees in the hedges of Italy. It also attains a considerable thickness of trunk, being sometimes four feet in circumference; and the wood possesses great durability. The varieties of the vine are very numerous; and in the catalogue of the Luxemburgh collection by Hervey, published in 1802, the following kinds are enumerated, namely, black oval

fruits, 37; black round fruits, 98; white oval fruits, 44; white round fruits, 73; grey or violet oval fruits, 5; grey or violet round fruits, 10; in all, 267. The grape-vine has an irregular, slender, and twisted stem; and sends out long, trailing, flexible branches, which climb by means of tendrils to a great extent. The fruit is a succulent berry, arranged in clusters, not much larger in the wild state than a pea, having a black colour, and containing five hard irregular seeds. In the cultivated kinds, the berry is round, oval or oblong, and is of a green, yellow, amber or black colour. Grapes if good should be soft, juicy, saccharine, and acidulous in taste, but not sour. According to Berard, the juice of the grape contains an odorous matter, sugar, gum, vegetable albumen, malic and tartaric acids, supertartrate of potass, and salts of lime. Grapes may be kept for a considerable time, provided the skin is not broken or crushed. Considerable quantities are imported from Portugal into Britain, placed in jars among saw-dust, in a perfectly entire state.

RAISINS—are dried grapes, and this is accomplished either by cutting the stalks of the bunches half through their thickness, and leaving them suspended on the vine until the fruit is dried; or, when ripe, collecting and dipping it in a solution of soda, to which a little quick-lime and oil is sometimes added. The first are the finest grapes, and are named muscatels and blooms; and the second lexias, the juice being frequently candied on the surface of the latter. In some places, such as Grenada, the grapes are simply dried in the sun.

CURRANTS or CORINTHS—are the small, black, and round grapes, named the Black Corinth, Ascalon Currant, or Corinthian Grape, and which are frequently destitute of seeds. They were formerly produced at Corinth, but now grow in Zante, Cephalonia, &c. This

fruit dried is used to a great extent in Britain in the composition of cakes, puddings, &c.

Uses. The grape contains a considerable proportion of nutriment, and is one of the most agreeable and digestible fruits we possess, if saccharine and not acid. It is gently aperient, and from its cooling and pleasant qualities, well adapted for persons labouring under febrile diseases, provided there is no derangement of the digestive organs. The skin and seeds ought to be rejected, as they are indigestible.

Raisins being more saccharine and containing much less water than grapes, in proportion to their weight, are hence more nutritious than the latter; but when too freely indulged in, are apt to produce indigestion. When of good quality, they are large, plump, and juicy. They are used along with figs, dates, &c., in the composition of decoctions for catarrhal affections of the chest. In this country both grapes and raisins are used to a great extent as a dessert fruit; and in warm climates they are sometimes eaten with bread.

WINE.

Wine is produced by fermenting the juice of the grape, and the most saccharine grapes furnish the richest wines. The quality, therefore, of wine depends very much upon the climate of the region where the vine is cultivated; and even in France this circumstance is remarked, for the southern provinces furnish the finest wines. Fair weather is preferred for gathering the fruit, and this is done as rapidly as possible, so that the pressing may be terminated in one day, and attention to these points is found to increase the durability of the wine. In Spain the vintage lasts for several weeks, so as to secure maturity to all the grapes; and the spoiled or insect-eaten fruit is not separated from that which is sound, even for the

manufacture of the best sherries. The whole is therefore thrown into the press, maturity being the only point attended to. Mr. Redding recommends three gatherings of the fruit at different periods, so that the different qualities may be properly sorted; and those intended for the manufacture of white wine should be shaken or bruised as little as possible on their way to the press. The colour of wines is derived solely from the husk of the grape; for when the juice alone of a coloured grape is fermented a colourless wine is produced; but if the husk or skin either of white or red grapes be added, a coloured wine is the result. It appears from this, that as soon as alcohol or spirit is generated by the fermentation, it dissolves the astringent and colouring matter of the husk. Mr. Donovan states that the husk communicates only a light red colour, and when the red is deep it is artificial. Grape-juice does not require the addition of yeast to excite fermentation; for it contains this principle in its composition or one that produces the same effects. It does not, however, begin to operate upon the other constituents of the fruit until the latter is bruised, and thus exposed to the air. A certain temperature is necessary for the success of this process, which is variously ranged by different authorities; but when the weather is cold, hot *must* is added. As the richness of the wine depends upon the quantity of saccharine matter contained in the *must*, a portion of sugar is added, if this be deficient. Flavour is sometimes communicated by shoots of the peach and almond tree, elder berries, &c. When the cream of tartar, which exists in the juice of all kinds of grapes, in varying proportions, is deficient, the fermentation does not proceed briskly; it is therefore found advantageous to add a portion of this salt in such cases, if a dry wine be wanted. Sweet grapes are said to contain the smallest proportion of cream of tartar, and hence they require,

for thorough fermentation, the addition of this salt. Some wines, however, contain a large portion of unfermented sugar; such as that made from the Malaga grape; others, such as Burgundy, have the whole of the sugar converted into spirit. During the fermentation a portion of tartar is thrown down; and the richer the wine is in spirit the larger is the proportion deposited. The same salt which is thus deposited at the bottom of the tuns, continues also to be precipitated from the wine after it has been put into casks or bottles. It is generally of a red or brownish colour, according to the quantity of colouring matter of the grape employed, is called *argols* in commerce, and is purified or converted into cream of tartar by boiling with clay. After the fermentation in the vat has been completed, the wine is put into casks or pipes, where it still undergoes the same process, though in an imperceptible degree. Wines that have been bottled before the fermentation is completed are named effervescing, from the carbonic acid gas which is generated being retained in the liquid under the pressure of the cork. Wine improves very much in bouquet, by keeping in bottles or casks; but there is considerable loss, not only in quantity but also in spirit, from the combination of the liquor with the wood and its consequent evaporation. All wines do not ameliorate by age. Some, although closely corked in bottles, become acid, which happens generally with weak wines, or when the juice of the grape does not contain a sufficient quantity of sugar; but many wines are liable to a renewal of the fermentation if some substance be not added which counteracts this tendency. Thus what is termed *sulphuring* is in general practice among wine manufacturers; and this is accomplished by burning sulphur matches in the casks, or adding *must* which has been strongly impregnated with sulphurous acid gas. The sulphuring process is liable to communi-

cate an unpleasant odour to wine, and some manufacturers employ red oxide of mercury, sulphuric acid, or the peroxide of manganese. Wines are also fined, or freed from the gluten or fermenting principle, by means of gelatine or white of egg, which causing a precipitate, carries this principle along with it to the bottom. Wine sometimes acquires a musty taste derived from the cask. Pomier states that this may be removed by agitation with olive oil. (Dr. T. Thomson.) The vinous flavour of wines is owing to the presence of a small portion of œnanthic ether; but the distinguishing aroma or bouquet of each particular kind depends upon the presence of a volatile oil.

The solid contents of wine are very trifling; thus in Port, Sherry, Bordeaux, Hock, Moselle, &c., they vary from 2 to 3 per cent. The quantity of alcohol or spirit contained in wines varies very considerably according to the quality of the grape, the degree of fermentation employed, the age, the mixture with brandy, &c; but the proportions in those described will be afterwards given. Wines are also very frequently adulterated, and sometimes are altogether factitious. Counterfeit wines are sometimes so skilfully made, that an experienced connoisseur is required to detect them. Red wines are often artificially coloured with brazil-wood, myrtle-berries, elder berries, beet-root, and even it is said with a solution of indigo. M. Accum states that spoiled cyder is employed in the manufacture of artificial port wine; and beet-root, logwood, rhatany root and a portion of brandy are added to it. Sweet-briar, orris-root, laurel-water and elder flowers are employed to form the aroma or bouquet of high flavoured wines. Weak wines often become acid, and to correct this state it was frequently the practice, at one period, to add litharge or an oxide of lead to them; but this plan is more rarely adopted at the present day. This addition communicates to the wine a sweetish taste, by

the formation of acetate of lead, but renders it more or less poisonous. This sophistication may be detected, by adding to the wine a solution of hydro-sulphuret of potass, which produces a black precipitate if lead be present. Chalk or carbonate of lime is more frequently employed than lead, and is not injurious in small quantities.

In the following account of the different kinds of wines, those in most general use shall chiefly be noticed.

CHAMPAGNE WINES—are produced on the banks of the Marne and in the district of Rheims, and are divided into sparkling, demi-sparkling and still wines. They are white, grey, rose-coloured and some are red. The average quantity of alcohol or spirit of wine they contain is according to Brande 12.61 per cent. The finest champagne is that which froths slightly, and it is improved by ice. The effervescing wines in most estimation are made on the banks of the Marne. The white still champagne named *Sillery* is more spirituous than any other white champagne, has a dry agreeable taste, an amber colour and is very durable, the fermentation being more perfect than that of the other kinds. Champagne wines are generally in perfection about the third year after they are bottled; but the finest kinds improve for ten or twenty, and are sometimes good at the age of thirty or forty years. Sparkling champagne is the variety most generally used in this country, and is bottled before the fermentation is completed; hence when the cork is drawn it soon loses its aroma or bouquet, which is carried away by the escape of the carbonic acid gas.

BURGUNDY WINE—has long been celebrated, and the Côte d'Or is the most famous district in this ancient territory for its production. Both red and white wines are manufactured in the district. Mr. Redding states that red Burgundy ought to be held first in estimation of all red wines from its delicious flavour and exquisite bouquet.

The Romanée Conti is considered the most perfect and best red wine in Burgundy, while Mont Rachet ranks highest of the white varieties. In their manufacture the fruit of the finest vines is selected, such as the *noirien* and *pineau;* but inferior kinds destitute of flavour and strength are also to be found in commerce. The average quantity of alcohol or spirit of wine in these wines is about 13.50 per cent.

CLARET WINES.—Under this term are included all the wines manufactured in the districts adjoining Bordeaux; but they are rarely imported into this country unmixed with other kinds. M. Redding states that "the product called Claret in England is a mixture of several sorts of wine; Beni Carlos and Berdeaux are thus mingled up for the English market; sometimes Languedoc and Bordeaux, and uniformly a portion of spirit of wine in addition." Medoc is the district most celebrated for the wine of Bordeaux, and the produce of Latour, Lafitte, Chateau Margaux are highly esteemed. The district named the Graves, as is supposed from its gravelly soil, also produces excellent wine, and Haut Brion is reckoned nearly equal to the three first-growths of Medoc.

The qualities of Claret are very various, but it has generally a purplish tint and delicate flavour, which is said to resemble that of the violet. The proportions of alcohol or spirit of wine which it contains are from 12 to 17 per cent.; but as it is a manufactured wine, its strength cannot be uniform. The Vin Ordinaire Bordx, according to Dr. Christison, contains 18.96 per cent. by measure of *proof-spirit.* The white wines of Bordeaux are divided into the dry and luscious, and the dry are generally produced in the Graves. The sweet are not bottled for several years and will keep for a long period.

RIVESALTES.—This wine is made in the vicinity of Rivesaltes, a town in the department of the Eastern

Pyrennees. When matured by age, it has a bright golden colour, fragrant aroma, with the flavour of the quince and an oily rich taste. It is considered one of the best muscadine wines. According to Dr. Christison it contains 22.35 per cent. by volume of *proof-spirit.*

MASDEU.—This wine is made at a vineyard named Masdeu in the department of the Eastern Pyrennees, and has recently been introduced into this country, being shipped from Port Vendres. It has a deep colour with a violet tinge, pleasant aroma and flavour, and is thought to resemble old port. It is generally mixed with a little brandy.

MALAGA WINE—is made in the mountains which surround Malaga. The sweet variety is made from a white grape, has a rich taste, an amber colour, and a delicate flavour. A portion of wine slightly *burned* is mixed with it, in order to give it the characteristic taste. A dry wine is also made in the neighbourhood of Malaga, which is sold as inferior sherry. The climate of Malaga is very favourable for the growth of the grape, and large quantities of this fruit, raisins, and wine, are exported from it to other countries. The amount of alcohol or spirit of wine in Malaga wine is about 18 per cent.

SHERRY WINE,—which is supposed to be the *sack* of former times, is made in the vicinity of Xeres, a town near Cadiz. Mr. Redding states, that 'about seven thousand acres of land are occupied with vineyards producing wine for the English market. The varieties of this wine are obtained by the different modes of treating it. Pale sherry is made from the same grape as the brown, a portion of gypsum being generally used, and two bottles of brandy are added to each butt of wine. Brown sherry receives its peculiar character, according to Mr. Redding, by the addition of a cheap boiled wine; and hence the colour is no criterion of its quality. A

light cheap wine named moguer is sometimes mixed with genuine sherry and a portion of brandy, and sent to England as inferior sherry. Sherry is also very frequently adulterated in London with cape wines, &c. Mr. Redding states that good sherry, of a year old, cannot be imported into Britain under thirty, or, when kept for four years, under forty-five shillings per dozen. Amontillado is the driest of all the Xeres wines, and it is said that the addition of brandy injures its flavour.

The average quantity of alcohol or spirit of wine in sherries, is about 20.40 per cent. According to Dr. Christison, the amount per cent. of proof spirit, estimated by volume, in different kinds of sherries, are the following: namely, weakest sherry, 30.84; strongest sherry, 35.12; sherry in East Indies, and long in cask, 32.30; amontillado, 27.60.

Tintilla, Tinto di Rota, or Tent Wine—is also a Spanish wine, made near Cadiz, of a red or purple colour, and having a sweetish strong spicy flavour. It contains about 13.30 per cent. of alcohol. It is reckoned stomachic.

Port Wine.—The district in which this wine is manufactured, extends along the banks of the Douro for about fourteen leagues from the city of Oporto. It is generally made from a black grape, and the husks and stalks are fermented together. A large quantity of brandy is generally added to it, before exportation, and frequently its amount is increased by additions in this country. Factitious port wine is also made in Britain, from cyder, elder berries, beet-root, logwood, rhatany-root, &c. Few wines are so frequently sophisticated as port, and some of the inferior kinds are little better than coloured vinegar, containing alcohol, a little sugar, and some astringent matter. Mr. Redding states that the best port wine exported to England, is produced at and about Pezo de

Regoa, which is situated in the centre of the upper Douro, and it resembles some of the Rhone growths or Côte Rôtie. Port wine being fermented with the husks and stalks of the grapes, generally contains a considerable portion of astringent matter. It has a deep red colour, and a rough spirituous taste, but these qualities are often increased by adulterations. The average quantity of alcohol in port wine, according to Brande, is 22.96 per cent. According to Dr. Christison, the weakest port contains only 30.56, and the strongest 37.27 per cent. by volume, of *proof-spirit*.

Bucellas—is a wine made in a vineyard near Lisbon. It is a dry, white, and light wine, but is often adulterated with brandy, which injures its naturally agreeable flavour.

Dry Lisbon—is also a light agreeable wine. These two wines contain about 18 per cent. of alcohol. According to Dr. Christison dry Lisbon contains 34.71 per cent. by volume of *proof-spirit*.

Madeira Wine.—This wine has been manufactured in the island of Madeira for several centuries, and has long been held in high estimation. In the manufacture of the first quality, the fruit is sorted, trodden by bare-legged peasants, then pressed, fermented in the pipes, and gypsum is added during the fermentation, which is generally continued for six weeks. Madeira wine, in order to gain excellence in quality, must attain age on the island, if it be not sent a voyage to a warm climate, such as the East Indies, and before it is shipped a portion of brandy is often added to make it keep. Mr. Redding is of opinion that a voyage to the East Indies is not necessary; for heat and agitation at home will answer the same purpose. In corroboration of his views he states, that a pipe of Madeira which had been attached to the beam of a steam engine, in an engine-house, for one year, could not at the end of that period be distinguished from the

choicest East India. This is a wine which bears age better than many other wines; for its flavour and aroma are much improved by keeping. Bitter almonds are added to the inferior qualities; but the finer kinds contain no foreign substance except a little brandy.

Madeira has a peculiar rich aromatic flavour, of a nutty and pungent character. The average quantity of alcohol is about 20.35 per cent. According to Dr. Christison, Madeira long in cask and in East Indies, contains only 30.80 per cent. by volume of *proof-spirit;* while the strongest contains 37 per cent.

MALMSEY MADEIRA—is made from over-ripe grapes, or by checking the fermentation with the addition of brandy to the must. It is a luscious wine, and has a delightful flavour. It contains, according to Brande, about 16.40 per cent. of alcohol or spirit of wine. According to Christison, Malmsey contains 28.37 per cent. by volume of *proof-spirit.*

TENERIFFE,—the dry Canary or Vidonia wine. It is much improved by age, resembles Madeira, and is often sold for it by a certain class of wine merchants. The term sack was formerly applied to the wines of the Canary islands.

GERMAN WINES—are different from all other kinds, being dry, generous, finely flavoured, and they keep for an indefinite number of years. The Johannisberger of the Rhine, the Brannenberger of the Moselle, and the Hockheimer of the Mayn, are the most esteemed of those wines, and give a kind of celebrity to the rivers on the banks of which the vine is cultivated. The grape generally preferred is a small white variety, which is sometimes harsh to the taste; but the vintage does not take place until the fruit is soft from over-maturity. The spoiled grapes and stalks are carefully separated from those of good quality, and the fermentation is conducted

in casks. The wine is afterwards transferred to large vessels named *fudders*, and allowed to remain there for years, in order to perfect its qualities. One of these *fudders*, called the heidelberg, is capable of containing six hundred hogsheads. The Johannisberger is reckoned the first of Rhenish wines; Hock is also much esteemed, and Moselle is only secondary to those of the Rhine or Mayn. At one period these wines, particularly hock, were not drank in their native districts until nearly fifty years old. German wines contain a large proportion of cream of tartar, which renders them acidulous. Mr. Henderson is of opinion that free tartaric acid is often a constituent of German wines, and is the cause of their easy preservation. They contain a small proportion of alcohol or spirit of wine, which varies from 8.71 in Johannisberger to 13.96 per cent. in Moselle. Dr. Christison found the first quality of Rudesheimer to contain 18.44 per cent. by volume of *proof-spirit*.

TOKAY WINE—is made from the Hungarian blue grape, which is cultivated around Tokay, a town of Hungary. The grape is large, having a luscious taste, and being allowed to over-ripen, the juice is very rich, and what spontaneously flows out when the fruit is placed on a groved table is called "essence of Tokay." After this juice has flowed out, the grapes are trodden in a vat, and a small portion of this essence is added to the *must*, when it is allowed to stand for twenty-four hours and then fermented. This wine is yellowish in colour, greenish when old, luscious, soft, slightly astringent, having a peculiar aroma, and appears oily in a glass. It must be kept for several years before it is fit for use, and it may be preserved for a very long period. At Cracau Tokay wine has been kept for a hundred years. Its amount of alcohol or spirit of wine is 9.88 per cent. Genuine Tokay

is a very expensive wine, and is considered the finest of the luscious varieties.

Lacryma Christi—is a wine of a red colour, luscious, and has an exquisite flavour, and the best quality is made at Galitta in Naples. Several other growths receive the same name; and a white muscadine wine, rich in perfume, is made near Vesuvius.

Marsala Wine—is produced in Sicily. When free of adulteration with inferior brandy, its quality is tolerably good, and it resembles some of the lighter kinds of Madeira or dry Lisbon wines. The average proportion of alcohol contained in it is very high, namely, 25.09 per cent.

Cape Madeira—is a boiled and mixed wine, and is frequently adulterated with inferior brandy, to save the expense of improving it by age. The greater part of the produce of the Cape of Good Hope is known by the name of "Stein wine," which when kept for six or seven years is often of good quality; but this is generally imported into this country for the purpose of adulterating other wines, and being new is harsh and disagreeable in taste. The average quantity of spirit of wine in Cape Madeira is 20.51 per cent.

Constantia Wine—is made in the Cape of Good Hope, near Cape Town. The vines cultivated are of the Spanish muscatel kind, and the wine is sweet, luscious, pungent, and is manufactured both of a red and white colour. Its proportion of alcohol or spirit of wine varies from 14.50 to 19.75 per cent.

Home-made Wines—are generally made from fruits, but as several of these are noticed under the articles from which they are manufactured, it is not necessary to describe them individually in this place. The acid in such wines is chiefly the malic, while in grapes it is the tartaric; but their great deficiency is the want of flavour.

Dr. M'Culloch has proposed the addition of cream of tartar as an improvement in their manufacture. They always contain an excess of acid and unfermented sugar, and are therefore not well adapted for those who have delicate digestive organs.

BRANDY—is procured by distillation from wine. The spirit often retains the flavour of the particular wine from which it was distilled, and it is said that persons of experience can not only tell from which wine district it comes, but from what species of grape the wine was made. This flavour depends upon the presence of an essential oil. The first product in the distillation of brandy is weak, and not well flavoured, and is thrown back into the still; but the next contains the proper aromatic principle. Brandy when pure is quite colourless, but what is found in commerce has generally more or less colour, derived from the cask or from the addition of burnt sugar. Brandy, like other spirits, is improved by age, and when kept in wood loses a portion of its spirit. Wines which abound in sugar that has been entirely decomposed during the insensible fermentation, afford the greatest amount of spirit. Acid wines furnish a tainted spirit, and a softer brandy is procured from white than from red wines. The grape cake or the *marc* always contains a portion of undecomposed sugar, besides being impregnated with the wine in the vat; it is therefore fermented along with water and distilled, affording an inferior species of brandy. An inferior quality of brandy is also made by distilling wine-lees diluted with water. This spirit is manufactured to the greatest extent in France, but it is also made in Spain, Portugal, and Italy, and Spanish brandy is considered next in quality to that of France. The vineyards of Languedoc, Bordelais, Orleans, &c., furnish a large proportion of this spirit. Brandy is very frequently adulterated, and some spirit dealers manufacture a factitious compound of rec-

tified whisky, orris root, burnt sugar, and sweet spirit of nitre. Berzelius states that a close imitation of real brandy may be made, by adding acetic ether to rectified spirit, with the addition of burnt sugar. The residuum of genuine brandy, after evaporation, strikes a black colour with the salts of iron; while that of the factitious, being sugar, has no such effect. The quantity of alcohol in brandy is 53.39 per cent.

DIETETIC USES OF WINE.—Wine has been used in all ages, and in almost all countries, and it is now so universally employed as to constitute a necessary element of civilised man's social enjoyment. When moderately used it seems to have no particular tendency, in a healthy individual engaged in active employment, to produce disease or shorten life. On the other hand, when taken to excess, as is done very frequently in the present luxurious age, it gives rise to many diseases which either cause much suffering, or shorten life to an extent which its votaries have never thought it necessary to calculate. Wine, however, is not such a hurtful stimulant as ardent spirits taken to excess, for the alcohol or spirit of the first is united chemically with its extractive matter, and is thus prevented from acting so injuriously on the coats of the stomach, or exciting the system so much as an intoxicating agent. It is stated by several writers on dietetics, that the same quantity of alcohol, taken in the form of wine, will produce very different effects on the body, from that which is used simply mixed with water. For a similar reason wines which contain brandy artificially added, are more injurious than those which have the same amount of spirit generated by the fermentation of the juice of the grape. The baneful effects of brandied wines may also in some cases depend upon the fact that more spirit is taken in the one case than in the other, for it is well known that port wine, which is consumed to a great

extent in Britain, is very generally mixed with spirit. Besides, brandy is more rarely added to good wines, and thus the consumer has to contend not only against the bad quality of the brandy, but also against the naturally bad quality of the wines. Wine appears to be capable of assimilation, for persons are often rendered plethoric or corpulent by indulging in it to excess. This cannot be accounted for from the quantity of extract it contains, for this is very small in many wines. Such effects occur also with drinkers of punch or toddy; hence it seems probable that alcohol, when combined with alimentary matters, or *merorganised* according to Dr. Prout's phraseology, is assimilated like many other carbonaceous substances.

At the same time, chemical analogy warrants the conclusion, that the alcohol which naturally exists in wines is differently combined with the other matters than that which is artificially added; and hence may on this account be assimilated to a greater extent. The moderate use of good wine, such as two or perhaps three glasses daily, to a healthy individual, stimulates digestion, excites the energies of the system, and increases the power both of the mental and corporeal functions. On the other hand, its abuse causes intoxication, nausea, vomiting, headache, feverishness; and when indulged in for a series of years, dyspepsia, gout, apoplexy, dropsy, mania and other diseases. Notwithstanding the evil consequences which result from the use of wine to excess, large quantities have sometimes proved very beneficial in the cure of certain diseases; such as typhus fever or other febrile maladies accompanied with great sinking of the powers of life. In estimating the dietetic qualities of different wines, it is first necessary to attend to a few of their leading properties. Thus new wine often disagrees with many individuals; for the fermentation not being completed, they contain much saccharine matter undecom-

posed, which is apt to be converted into lactic acid in the stomach.* A similar objection applies to sweet and luscious wines, for though old, they are too rich in saccharine matter to admit of their thorough fermentation; and consequently when mixed or diluted with the other fluids of the stomach are liable to cause acidity, &c.

Acidulous wines such as Hock, Moselle and other German varieties, which if good are only acidulous from the quantity of tartaric acid or tartar they contain, are quite wholesome to a healthy individual; because they are dry or thoroughly fermented, light, contain little alcohol, and are little liable to the acetous fermentation. But if new or not of good quality, they should be avoided by the dyspeptic as liable to occasion indigestion. These wines are also considered less heating, less liable to produce corpulency, and more diuretic than other wines. Bordelais or claret wines, when of good quality, are well adapted for ordinary use as, they are light, well fermented and contain little spirit. The claret generally imported into this country, however, presents two obstacles to its general adoption, namely, its high price and its mixture with spirit and other wines of inferior quality. Effervescing wines, such as champagne, are extremely agreeable, but produce rapid intoxication, although they do not contain much spirit. This effect is supposed to be owing partly to the carbonic acid, and partly to the spirit carried along with the gas being applied to a large extent of nervous surface. It is not a wine adapted for general use; and as it contains unfermented saccharine matter, it is liable to produce acidity in persons who have weak digestive organs. Port, Sherry and Madeira are dry or thoroughly

*It is possible, however, to make new pass for old wine, with ordinary judges. Mr. Redding states that new is made to imitate old claret by uncorking and pouring a glassful out of each bottle, then replacing the corks, putting them for a short time in an oven, cooling them gradually, and then refilling the bottles. Port is put into water heated to the boiling point and then placed in a cellar, by which process the bottles become incrusted

fermented, and strong wines, and are well adapted for those who use wine moderately; but great care ought to be taken in their selection, particularly of port, and, if they are in the least degree acid, they should be rejected. Port wine has a popular reputation for being more tonic than other wines, from the astringent matter it contains; but according to my experience, good sherry, which is more rarely acid, agrees much better with the dyspeptic and those who have weak digestive organs than the former. Madeira is also an excellent wine when genuine; but inferior kinds often contain a superabundance of acid.

Home-made wines although they agree generally with healthy individuals are not adapted for the dyspeptic.

DIETETIC USES OF BRANDY AND OTHER ARDENT SPIRITS. Ardent spirits, when taken undiluted in large quantities, are a most violent poison; and fatal consequences have frequently resulted from an over-dose. At the same time it must be admitted that these liquors are swallowed every day, to an enormous extent, by persons accustomed to their use, without any immediately dangerous result. Nothing, however, has proved a greater curse to many regions of the earth than the abuse of ardent spirits; and undoubtedly they have tended much to foster the misery, destitution and crime of this and other countries. Ardent spirits, however, like wine and many other luxuries, may be used with perfect safety in small quantities; and sometimes they are found to agree better than wine with those who have digestive derangements, if well diluted with water. Many wines are liable to produce acidity of stomach and thus occasion much derangement of the digestive process; but pure spirit is incapable of any such change; and thus the stimulus and the other beneficial effects of the alcohol, are experienced without any deranging process of acescency. It may therefore be deduced from this, that the addition of any substance to

them capable of the acetous fermentation is injurious; and so it is found to be, if added in quantity sufficient to support this process; but a small portion of refined sugar renders the mixture more agreeable. This addition also *merorganises* the spirit to a certain extent, so that it is prevented from acting so injuriously on the coats of the stomach, or diffusing its stimulus so rapidly through the system. The abuse of ardent spirits, however, more certainly induces disease and shortens life than an indulgence in wine, and though it is astonishing how long a few persons will bear up against its baneful influence, yet sooner or later they fall victims to disease of the liver, kidneys, stomach, &c., or to apoplexy and palsy, while some are carried off suddenly by *delirium tremens*. Various properties are popularly applied to the different kinds of ardent spirit; such as that brandy is cordial and stomachic; rum heating and liable to occasion headache; gin and whisky diuretic; and arrack styptic, heating and narcotic. Although there may be a portion of truth in some of these opinions, they are undoubtedly much exaggerated; for the principal difference amongst genuine distilled spirits consists in the small quantity of essential oil peculiar to each, and which gives them their characteristic flavour.

Liqueurs or Cordials—are in general, compositions of ardent spirit, sugar, fruits and various other substances mixed together. Several of these are noticed under other sections; but many of them cannot accurately be described, as the formulæ for making them are various. Many of these compounds are injurious, especially those that contain much fruit or sugar, and more calculated to derange than to promote good digestion.

THE OLIVE.

Olea Europæa.—Oleaceæ.—The Olive Tribe.—The olive tree is a native of Asia, and is found abundantly in

the vicinity of Aleppo and Lebanon. It is cultivated extensively in Italy, Spain, France, &c.; and is found in hedges and woods. It sometimes attains a great age, and there are some plantations at Terne in Italy that are believed to have existed from the time of Pliny. The olive tree generally attains the height of from twenty to thirty feet; and its wood is hard, compact, of a reddish colour and takes a good polish. It thrives well on calcareous soils, but not in elevated situations or at a distance from the sea. From its useful properties, the little culture it requires, and the otherwise barren situations which it renders productive, the olive has, in all ages, been considered the emblem of peace and plenty. The fruit or plum is smooth, has an oval shape, and when ripe a violet colour, and is fleshy in texture. The pulp is bitter and oily in taste, and encloses a nut or stone of an oval-oblong shape. Several varieties of the olive-tree are cultivated; but the long-leaved kind reared in Italy and France is said to produce a much finer oil than the large and broad-leaved variety cultivated in Spain, and which yields a larger fruit. Olives are recommended to be gathered in the first stage of their maturity, for if this be delayed too long, the next year's crop is prevented. The fruit is generally gathered in November, when thoroughly ripe, and put immediately into a mill, for the purpose of crushing the pulp which contains the oil in its cells. The pulp being separated from the nuts, is put into bags made of rushes, and moderately pressed. A greenish-coloured oil is thus obtained, which from its comparative purity is named virgin oil. A second quality is obtained by moistening the *marc* or fibrous part of the pulp that remains with water, and again submitting it to pressure. A third or very inferior quality is procured by soaking the *marc* in water and subsequently fermenting it. In Spain the ripe and unripe olives are mixed together in a

heap, which soon causes fermentation and a softening of their texture, and in this state are submitted to the press; but an inferior and disagreeably flavoured oil is the result. The best olive-oil is said to come from Provence; but the produce of Lucca and Florence are generally used at table in this country. Olive-oil has a yellowish-green, but sometimes a pale yellow colour, is insipid to the taste, and almost destitute of odour. It congeals at 38° Fahr., is of light specific gravity, and when exposed to the air for any length of time becomes rancid and brownish in colour.

ADULTERATION OF OLIVE-OIL.—Olive-oil is frequently adulterated with oil of poppies. This may be detected by the pernitrate of mercury. Dissolve, without heat, 6 parts of mercury in 7½ of nitric acid (sp. gr. 1.35), and mix 1 part of the resulting solution with 12 of the suspected oil. If adulterated with oil of poppies or linseed-oil, it retains to a certain extent its fluidity and becomes dark-coloured; but, if pure, it is completely solidified, assumes a yellowish-white colour, and becomes as hard as sheep's tallow.

USES. The finer qualities of olive-oil are used in Spain, Italy, &c., in place of butter; and in point of dietetic properties these two substances are very nearly allied. Oil is a very nutritive species of aliment, but it cannot be used alone, in sufficient quantity, to support the system for any length of time. First, because it has been found from the experiments of Majendie, that animals, when fed with oil without any admixture of other kinds of food, soon die; and, second, they get so disgusted with this aliment, and it is so liable to generate rancidity in the stomach, that it cannot be tolerated. In this country, oil is chiefly employed as a sauce or condiment in dressing fish, salads, &c.; but in Italy and the south of Europe it is more generally used as a sub-

stitute for butter. Oil cannot be used with impunity by those who have weak digestive organs, except in very limited quantities; and as it is found that oils and other fatty bodies, when taken uncombined with other alimentary matters, are more difficult of digestion and more apt to occasion rancidity than when united with other substances, this union should either be effected by the processes of cookery, or through the medium of mastication.

Pickled Olives—are prepared from the unripe fruit by maceration in water, and quicklime or some of the alkalies are occasionally added to quicken the operation. They are then put into bottles along with a watery solution of common salt, and some aromatic is frequently added. In this country they are generally used as a dessert; but in the south of Europe they are taken before dinner to whet the appetite. Two kinds of pickled olives are imported into this country, namely, the Spanish, which are larger, more bitter, and inferior to the French from Languedoc. Olive-oil is useful in catarrh, when combined with water, through the medium of gum, sugar and potass. It is also used internally to mitigate the effects of acrid poisons, and as a laxative. It is employed to a considerable extent in the composition of ointments, plasters, &c. It is used at Tunis to anoint the body, for the purpose of securing the individual from the contagion of the plague. The coarser kinds of olive-oil from Italy, Spain, &c., are extensively used in woollen manufactures, in dyeing turkey-red, and sometimes in soap-making.

THE ALMOND.

Amygdalus Communis.—Amygdaleæ.—The Almond Tribe.—The almond-tree is a native of Syria, but is now naturalised in the south of Europe, and has been

cultivated in British gardens since the year 1538. The first notice of it is found in the Bible, but it is also mentioned by Virgil. In Britain, the almond-tree is about twenty or thirty feet in height, having a spreading head, but thin of branches. It blossoms very early in Spring; at Smyrna in February, in Britain during March, before the leaves make their appearance; and though frost may destroy the germs of the fruit, it has little effect on the beauty of the flowers. The fruit or drupe of the almond is egg-shaped, having a dry and fibrous or coriaceous rind, which separates irregularly, exposing a nut, the shell of which exhibits various appearances, being pitted or smooth, and hard or fragile. The kernels are covered with a brown pellicle, which may be very readily removed by an immersion, for a few minutes, in very hot water. They then consist of a white hard pulp, which is sweet and agreeable to the taste in the variety named the *sweet almond*, but bitter and aromatic in the *bitter almond*. Neither of these varieties have any odour in the dry state. The trees which produce these very different kinds of fruit are not generally considered distinct species, but only varieties of the same plant. According to Boullay, the sweet almond contains fixed oil 54, sugar 6, gum 3, vegetable albumen 24, ligneous fibre 4, pellicles 5, water 3.5, and a minute portion of acetic acid. There are two principal varieties of almonds, namely, the Jordan, which comes from Malaga, and which is superior to the second variety, the Valentia almond. Almonds contain more than half their weight of oil; which is obtained by first freeing them of the yellow adherent powder, and then employing expression without heat. The bitter almond is the variety generally used for expression, because it is cheaper, and the cake which remains, being distilled with water, yields the essential oil procurable from the kernel. The fixed

oil has a yellowish tint, a sweetish taste, and is destitute of odour.

Bitter Almonds—differ from the sweet in containing a crystalline body named amygdaline, and which is the source of their poisonous properties; but the fixed oil, or sweet oil of almonds, is the same in both varieties. When the bitter almond is distilled with water, a volatile oil is procured, which contains a considerable proportion of hydrocyanic or prussic acid, and is consequently very poisonous. The formation of this acid is believed to be owing to the action of the water employed, upon the emulsine and amygdaline of the kernel; and that it does not exist naturally in bitter almonds, which have no odour when entire, but when triturated with water have that of the fresh blossoms. Bitter almonds rarely prove poisonous, but there can be little doubt that if eaten in quantity, dangerous effects would be the result.

Uses. Almonds are used both in the ripe and unripe states, and a preserve is sometimes made of the green fruit. They are most generally used, however, when ripe, as a dessert fruit, and are frequently brought to table deprived of the shell, and sometimes blanched or deprived of the pellicle. From the large quantity of their contained oil and albumen, they are very nutritious, but heavy and difficult of digestion, especially if not thoroughly masticated. They are by no means well adapted for those who have delicate digestive organs; and as they are frequently employed in the composition of articles of cookery and confectionary, the latter ought to be avoided by such individuals. Sweet oil of almonds is used in affections of the air-passages, lungs, &c., combined with gum arabic, sugar, water, &c. It is used as an external application to the ear in diseases of that organ. It is the basis of many odoriferous oils that are

applied to the hair. Almond cake or almond powder is employed in washing the hands, in order to keep them soft during cold weather.

Bitter almonds, or their essential oil, are chiefly used in flavouring articles of cookery and confectionary; but great caution ought to be employed in using the latter, for what is sold under the name of the *Essence of Bitter Almonds* is nearly as strong as the medicinal prussic acid. The wood of the almond-tree, which is hard and of a reddish colour, is used in veneering and in making handles for carpenters' tools. The gum which exudes from it, is used like gum arabic for various purposes; but it is less soluble in water.

THE PEACH AND NECTARINE.

Amygdalus Persica. — *Amygdaleæ.* — THE ALMOND TRIBE.—The peach is a native of Persia, and has been cultivated from time immemorial in most parts of Asia. It is mentioned by Columella, and was afterwards described by Pliny. Few varieties of peaches come to proper maturity in the open air, in Britain, during ordinary seasons; but all the kinds arrive at perfection by the aid of hot walls or glass. It is a standard fruit-tree in fields and gardens in Italy, Spain, the north of Africa, and in various Eastern countries. It is cultivated extensively in North America, for the distillation of *peach brandy* and fattening hogs. The peach and nectarine are generally considered as varieties that have sprung from the almond, though some authors have made them distinct species. The peach-tree, in its natural state, is from ten to fifteen feet high; the fruit is downy, roundish, and is marked with a longitudinal groove. The pulp is large, fleshy, succulent, yellowish, but sometimes reddish in colour, and contains an agreeable, sweet, and acidulous juice. The stone is hard, furrowed, and the kernel bit-

ter. According to Miller, a good peach should possess the following properties. "The flesh is firm, the skin thin, of a deep or bright-red colour next the sun, and yellowish-green next the wall, the pulp of a yellowish colour, full of high-flavoured juice, the fleshy part thick, and the stone small."

THE NECTARINE—is distinguished from the peach by its smooth, firmer, and more plump fruit; but in other respects their general history and culture are the same. According to Berard, ripe peaches contain colouring matter, gum, vegetable fibre and albumen, malic acid, 16.48 per cent. of sugar, and 74.87 of water.

USES. Peaches and nectarines are highly esteemed fruits, and contain a considerable quantity of nutriment, which is chiefly derived from the sugar and gum they contain. When eaten in moderate quantities, they are sufficiently digestible, aperient, and when thoroughly ripe, they contain little acid. Peaches are made into preserves with sugar, and are sometimes added to puddings. The leaves and flowers of the peach possess properties similar to those of the almond, and prussic acid may be procured from them by distillation. Peach blossoms are used, in the form of infusion, for the cure of worms. The leaves, infused in whisky or gin, give it the flavour of noyau.

THE APRICOT.

Prunus Armeniaca. — Amygdaleæ. — THE ALMOND TRIBE.—The apricot is a native of Armenia, was cultivated by the Romans, and it is believed that they introduced this fruit into Britain. In China and the Caucasus it is more frequently found on mountains than in plains; but in England it seldom ripens its fruit, except when trained against a wall. It is rather a low and slightly crooked tree, having roundish or cordate leaves, and it

blossoms early in the season. The fruit is round, yellow both externally and internally, the pulp is rich, saccharine and acidulous, being firmer than that of plums or most peaches. The stone included in the pulp is smooth and similar to that of the plum. Ripe apricots contain, according to Berard, the following constituents, namely, vegetable fibre, albumen, malic acid, about 5 per cent. of gum, 11.61 of sugar, and 80.24 of water.

Uses. Apricots contain a considerable proportion of sugar, but not so much as the peach, and are consequently not so nutritive, but the proportion of their contained water varies in the different kinds. This fruit is esteemed next to the peach and nectarine; but ought, like them, to be moderately used, as it is liable to produce indigestion. It is made into preserves, marmalades, jellies, &c. Lozenges are made by the Chinese from the clarified juice, which, being dissolved in water, yields a cool refreshing beverage. Oil may be extracted from the kernel, which is bitter in some varieties, and sweet in others. The young shoots have been employed to dye wool of a golden cinnamon colour; and a gum, similar to gum arabic, is procured from the tree.

THE SLOE.

Prunus Spinosa.—Amygdaleæ.—The Almond Tribe. —The sloe or *blackthorn* is a native of Europe and America, and is abundant in Britain in hedges and thickets. In hedges it seldom exceeds twenty feet in height, but in woods it sometimes attains to that of thirty feet. It is believed by some botanists to be the parent of the domestic plum. The fruit or drupe, when ripe, is black, round, covered with a bluish exudation, and is sour and astringent to the taste. It has not been particularly analysed, but it contains a considerable portion of tannin or astringent matter, and its juice is viscid.

This fruit is scarcely eatable, until it has been exposed to frost, which renders it sweeter by the generation of saccharine matter.

Uses. The ripe fruit forms an excellent preserve, and its juice is used in the manufacture of cheap port wines. In France, the unripe fruit is pickled in salt and vinegar as a substitute for olives; and its juice, evaporated to dryness by a gentle heat, forms the *German acacia*, used as an astringent. The fruit, however, is not astringent after it has been modified by frost, and begun to decay; but, like the plum, is then nutritive and slightly aperient. The juice of the ripe fruit stains linen and wool of a dark colour, and is sometimes used as an indelible ink. The leaves are considered an excellent substitute for tea; and have been frequently employed, to a great extent, in its adulteration. Cattle of every kind are fond of them, both in the green state and when dried. The wood of the tree is hard, takes a fine polish, and is used in making handles for tools and walking-sticks. Sloes have been recommended as an astringent in diarrhœa and in hæmorrhages. The bark has been used in the cure of fevers, and for tanning leather.

THE PLUM.

Prunus Domestica. — *Amygdalæ.* — The Almond Tribe.—According to Pliny, the plum-tree was brought from Syria into Greece and Italy; and it is naturalised in Britain, being frequently found in hedges. It generally attains the height of about fifteen feet. The natural colour of the fruit is said to be black; but it is blue, yellow, green, and has also a different shape, size, and flavour, according to the numerous varieties in cultivation. The pulp of the finest kinds is sweet, juicy, agreeable, and the *Reine Claude* or Green Gage, when ripe, contains, according to Berard, albumen, vegetable fibre,

malic acid, gum, 24.81 per cent. of sugar, and 71.10 of water. (Berzelius.) The kernel of the plum-stone contains fixed oil, which may be procured by expression, and some kinds have the odour of prussic acid.

Uses. Plums of rich quality contain fully one-fifth of their weight of sugar, they are consequently very nutritive as a fruit. When thoroughly ripe, and eaten in moderate quantity, they are tolerably digestible; but when taken to excess, are liable to produce diarrhœa, especially in persons liable to derangements of the stomach. Plums, besides being frequently used as a dessert-fruit, are much employed in making conserves, tarts, &c.

Prunes—consist of the fruit dried by a particular process, and the best qualities are manufactured in France, near Tours, from the large yellowish plum called the *Catherinea*, and the purple coloured variety, the *prune d'Agen*. According to Mr. Loudon, the plums are gathered when ripe, and exposed to the sun for several days until they become soft, but afterwards to the heat of an oven, three times in succession. They are then rounded, an operation performed by turning the stone in the plum without breaking the skin, and pressing the two ends together between the finger and thumb. Finally, they are again baked in the oven at a moderate heat, and packed loosely in small boxes. Prunes have a very sweet taste, and being freed from a considerable portion of water, may be considered as consisting chiefly of sugar. They are used as a dessert fruit, are frequently stewed, and are added to soups as a nutrient and aperient food for invalids. They are also added to infusions of senna and other drugs, chiefly for the purpose of concealing their disagreeable taste.

Two kinds of ardent spirits are prepared from plums, namely, Zwetschen Wasser and Raki, the latter being

made in Hungary. Both of these *liqueurs* are said to resemble kirsch-wasser. In the south of France, an excellent spirit is obtained from the pulp and kernels fermented and afterwards distilled. The wood of the plum-tree, which is hard and beautifully veined, is used in cabinet-making, turnery, and in the manufacture of musical instruments. A particular kind of viscid gum is procured from it, similar to the coarser kinds of gum arabic. This gum, like gum arabic or other varieties of this principle, is nutritive, rather slow in digestion, but little liable to produce acidity of stomach.

THE CHERRY.

Cerasus vulgaris.—*Amygdaleæ.*—THE ALMOND TRIBE.—The cultivated cherry was introduced into Italy by Lucullus, a Roman general, in 73 A. C., from a town in Pontus in Asia, which was named Cerasus. It was brought into Britain about a century afterwards. The cherry-tree is now cultivated to a great extent, both as a wall and standard fruit, is middle sized, has ash-coloured, shining and roundish branches, ovate serrated leaves, and white flowers. The fruit or drupe is red, having an acid sweet pulp, enveloping a stone containing a kernel. The varieties of the fruit are exceedingly numerous, and according to the report of the London Horticultural Society, there are 219 sorts. The French divide their cherries into three sorts. 1. Those belonging to the present species. 2. Hard fruited cherries. 3. Wild cherries, to which the *gean* belongs. Ripe cherries contain, according to Berard, vegetable fibre, albumen, malic acid, gum, 18.12 per cent. of sugar, and 74.85 of water.

USES. Cherries contain a considerable quantity of sugar, are nutritive, digestible, sapid, and very agreeable. When the pulp is hard, sour, or unripe, they are very apt to cause derangements of the digestive organs. The

cherry forms an excellent dessert fruit, and is also used in the preparation of pies, tarts, soups, preserves, lozenges, cherry-brandy, &c. In France, Germany and Russia, ripe cherries are dried on boards by exposure to the sun, or in an oven moderately heated. The kernels furnish an oil which is employed to give creams, &c., the flavour of bitter almonds. The celebrated spirit called Kirsch-wasser is prepared from this fruit, in the following way, according to Mr. Loudon. "Take bruised cherries in which the greatest part of the kernels have been broken, let them remain in a mass till the vinous fermentation is fairly established, after which the process of distillation is commenced and continued as long as the liquor comes over clear." The best kirsch-wasser is made at Alsace in France, at Wirtemberg, at Berne, and Basle in Switzerland, and the wild black gean is preferred for its manufacture. The liqueur called Maraschino is made from a small acid cherry named *marasca*, which is found abundant in the north of Italy and Dalmatia, and what is manufactured in the latter country is considered the finest. The process employed in making it is very similar to that adopted in the manufacture of kirsch-wasser, the difference consisting in the addition of honey to the bruised cherries, and this substance or sugar is added to the spirit after it is distilled. It is stated that genuine maraschino is very difficult to be procured, the greater part of that which is sold being kirsch-wasser mixed with water and honey or water and sugar. The cherry-tree exudes a species of gum, similar in appearance and properties to some kinds of gum arabic. The two inner layers of the bark have been used as a substitute for peruvian bark, and are said to furnish a yellow dye. The wood of the cherry-tree is soft, has a reddish colour, takes a fine polish, and is much esteemed by cabinet makers, turners, and manufacturers of musical instruments.

GEAN OR GEEN-TREE.—*Cerasus Juliana*, a variety of *cerasus sylvestris*, is a native of Europe, and found in woods and hedges, dwarfish in unfavourable soils, but sometimes attains the height of forty or fifty feet. The fruit when ripe, is ovate, small, generally of a dark red or black colour; the pulp is sweet, soft, and the skin does not separate from it. Geans possess the same alimentary properties as the cultivated cherry, and the pulp being in general soft, when thoroughly ripe, they are easily digested.

THE PEAR.

Pyrus Communis.—Pomaceæ.—THE APPLE TRIBE.—The pear is mentioned by Theophrastus and Virgil, and was common in Syria and Greece, from which latter country it was brought into Italy. It is a native of Britain and other European countries and is found in woods and hedges. It is also found in Asia, but not in Africa or America. The pear has considerable longevity, living for four or five hundred years. Its fruit in the wild state is very small and austere to the taste. The varieties of this fruit are exceedingly numerous; and according to the catalogue of the London Horticultural Society there are 677 sorts. This tree attains the height of twenty to thirty feet, will grow in almost any soil, and is thorny in the wild state, but not so when cultivated. According to Berard, the ripe fruit contains vegetable fibre, albumen, malic acid, gum, 6.45 per cent. of sugar and 86.28 of water. It varies exceedingly in taste, consistency and flavour; but when of good quality, it is sweet, sapid and slightly acid.

USES. Pears contain more water and less nutritive matter than peaches, apricots, plums and cherries, but according to Berard's analysis, the proportions are about the same as those in apples. The pear, when soft, juicy and sweetish may be considered a very good dessert fruit; but when hard, tough or sour, it is perhaps the most

indigestible of all kinds of ordinary fruits, and very liable to produce serious derangements of the digestive organs. Pears are sometimes stewed, and they enter into the composition of marmalades, tarts, &c. In France, Belgium and Russia, the "melting sugary pear" is dried in an oven; and if this process be carefully performed, it will keep for a year or two in a dry place. The dried pears sold by the grocers in boxes undergo a more complicated process. They are gathered when scarcely ripe, par-boiled in a little water, peeled, and the juice is allowed to flow out. They are then put into an oven for twelve hours, afterwards steeped in their own juice which has been sweetened with sugar and seasoned with cinnamon, mace and brandy. They are put into the oven a second time, and this alternate operation of maceration and drying is repeated four times. If properly treated they have a pale brown colour and a fine semitransparent pulp.

PERRY—is a vinous liquor made from pears by fermentation, in the same way as cyder is manufactured from apples. The pears may be either large or small, but the austere-tasted varieties afford the best liquor, and good perry may be made from the wild fruit. It is extensively manufactured in Worcestershire and Herefordshire in England, and in various parts of Germany and France. A full-grown tree will yield, it is said, about twenty gallons of perry annually. Perry is a pleasant, cooling and acidulous drink; but liable to occasion flatulency and acidity. It contains according to Brande 7.26 per cent. of alcohol or spirit of wine, and would therefore cause intoxication, if genuine and taken in quantity. Perry was a popular remedy among the Romans for poisonous mushrooms; and is still used at the present day with similar intentions. The wood of the wild pear-tree is heavy, compact, and has a fine grain which is slightly tinged with red. It is easily stained of a black colour,

and then closely resembles ebony. It is sometimes used for coarse engravings on wood, such as large plans, &c.; but is much inferior to the box. It is employed by turners, pattern-makers, &c.; and an excellent charcoal may be made from it. The leaves furnish a yellow dye, and have been used to give a green colour to blue cloths.

THE APPLE.

Pyrus Malus.—Pomaceæ.—THE APPLE TRIBE.—This tree is found native in every part of Europe, and also in Western Asia, China and Japan, but not in America or the torrid zone. In Britain it is found wild in hedges, on the margins of woods, &c.; and its fruit is termed a crab. It was known to the ancients, and is mentioned in the Bible, and by Herodotus. It is generally believed that the cultivated apple was introduced into this country by the Romans, to whom twenty-two varieties were known in the days of Pliny. It is supposed by some authors to attain a great age, such as a thousand years; but Mr. Knight considers two hundred years as the average duration of a healthy tree grafted on a crab-stock. The apple-tree whether wild or cultivated is not so handsome as the pear-tree, neither does it attain the same height. The varieties of this fruit are very numerous and almost beyond belief. Mr. Don has enumerated fourteen hundred, distinguishable by their colour, form, size or quality. The crab or fruit of the wild apple-tree, is globular, yellowish in colour with a tinge of red, very acid, astringent, and its expressed juice is named *verjuice*, which is sometimes used in England as a popular application to sprains and scalds. Mr. Don says that the criterion of a good apple for the table is a firm juicy flesh, elevated, poignant flavour, regular form and beautiful colouring; for kitchen use, the property of forming a pulpy mass of equal consistency, when baked or boiled; and for the

manufacture of cyder, a considerable degree of astringency is required with or without firmness of pulp or richness of juice. The composition of the apple is very similar to that of the pear; sugar and a little gum being the principal nutritive elements in both. (See pear-tree.)

Uses. Apples do not contain much nutriment, but when juicy, saccharine and soft, are pretty easily digested; but if sour, or hard in texture, extremely liable to cause derangements of the digestive organs. When kept for several months, they become softer and sweeter, and a still greater change, in these respects, is effected by roasting or stewing, the acid quality being diminished and the saccharine increased. Stewed apples are therefore more digestible than in the raw state, and better adapted for convalescents and persons of delicate constitutions. Apples are sometimes dried in an oven to effect their preservation; and are employed extensively in the preparation of jellies, tarts, sauces, &c. A decoction or infusion of apples is used under the name of *apple-tea* or apple-water, as a cooling agreeable drink in febrile affections.

Cyder—is prepared from apples by fermenting the expressed juice. Herefordshire, Worcestershire and Devonshire are the most celebrated districts in England for the manufacture of this beverage. When of good quality, it should be sweet, sharp and acidulous; but if very acid, there is reason to fear that it has either wholly or partially been converted into vinegar. According to Mr. Brande, it contains from 5 to 9 per cent. of alcohol or spirit of wine. Cyder is a very pleasant drink, and with healthy individuals may often be substituted for ale or porter; but it is liable to produce acidity in those who have weak digestive organs. A favourite sweetmeat is made in France by boiling the pulp of apples with new wine, until the whole is thoroughly united.

It is used like marmalade, and in Italy is eaten with Indian corn or macaroni. The wood of the apple-tree is hard, variegated in colour, and frequently used by joiners and turners. The bark affords a yellow colouring matter, and has been used in dyeing. According to Gerard the herbalist, pomatum was formerly made from the pulp of apples beat up with hogs-lard and rose-water.

THE QUINCE.

Cydonia Vulgaris.—Pomaceæ.—THE APPLE TRIBE.—The quince-tree is supposed to have been originally a native of Cydon, a city in Crete; but at the present day it is indigenous in the south of Europe, and is found among rocks and in hedges. The fruit was known to the ancient Greeks and Romans; and was employed to decorate the images of household gods. The ancients considered it the emblem of love, happiness and fruitfulness; and the brides and bridegrooms of Greece and Rome ate of it as soon as the marriage ceremony was performed. It has been considered the fruit of the forbidden tree; for the Jewish traditions describe it as having a golden colour. The quince is a low tree, having a crooked stem, rarely attaining more than fifteen or twenty feet in height, and there are several varieties. The fruit is large, globular, oblong or pear-shaped, of a rich yellow or orange colour when ripe, and having a strong peculiar odour, somewhat like that of the apple. Its taste is austere and acidulous, and it contains numerous reddish-brown angular and cartilaginous seeds. The pulp is composed of sugar, vegetable jelly, astringent matter, malic acid, &c. The seeds contain a large proportion of a very peculiar and strong mucilage; and 1 part of them is sufficient to give 40 parts of water the consistency of white of egg.

USES. The quince is not eaten in the raw state, but is stewed or made into tarts with apples. It is also made

into syrups and marmalades. Its dietetic properties are similar to those of the apple or pear; and ought to be used sparingly by those who have feeble digestive organs. It was formerly employed in the cure of diarrhœa, dysentery, and for checking vomiting, on account of its astringent properties. The mucilage, prepared from the seeds, is sometimes used in the formation of gargles, and for suspending oily and resinous substances in water. A wine is made from quinces, in the same way as other fruit wines are manufactured in England.

THE MEDLAR.

Mespilus Germanica.—Pomaceæ.—THE APPLE TRIBE.—The medlar was known in ancient Greece, and has been cultivated in British gardens for an indefinite period. It is a native of Europe, the west of Asia, and in several parts of England, and is found growing wild in hedges and woods. It is an ornamental tree, and attains the height of from ten to twenty feet, has tortuous fantastic branches, large leaves and large white flowers. There are several varieties, the Dutch being the largest, but the Nottingham is the only kind worthy of cultivation for its fruit, in England. The fruit or pome is of a turbinated shape, five-celled, and when plucked from the tree at the end of autumn is green, hard in texture, and has an austere taste. It is placed in straw, and is not used before it becomes partially decayed, when it is less acid and astringent and more saccharine. The flavour of the medlar is peculiar, but it is a fruit much esteemed by some individuals. It has been supposed useful in diarrhœa, and the seeds have been prescribed in calculous diseases.

THE PINE-APPLE.

Bromelia Ananas.—Bromeliaceæ.—THE PINE-APPLE TRIBE.—The pine-apple is a native of the warm regions

of America, Africa and Asia, and is cultivated in Europe, in green-houses. This fruit has an oblong or conical shape, a yellow colour when ripe, a fleshy consistency, a rich and very agreeable taste, accompanied with a peculiar aromatic odour. Before maturity, the taste of the pine-apple is almost caustic, and its use at this period is said to be dangerous; even when ripe, it contains a large portion of citric and malic acids, and its juice corrodes instruments of steel very rapidly. It is reckoned the finest of all dessert fruits, and is eaten with sugar, wine and ardent spirits, after being peeled and cut into thin slices. It is apt to produce flatulency and derangement of the bowels, like many other acid fruits. It may be made into a preserve with sugar, and in this state will keep for a long period. A very agreeable species of wine is made by fermenting the juice of this fruit. It has been used in calculous affections and diseases of the bladder.

THE MANGO.

Mangifera Indica. — *Anacardiaceæ.* — THE CASHEW TRIBE.—This tree is a native of the East Indies, but is now cultivated in the West India islands, attains the height of thirty to forty feet, has a large spreading rounded shape, and forms a beautiful ornament to a lawn or park. The fruit is a berried drupe, of an oblong shape, smooth and of a yellow colour. There are several varieties, which differ in colour and other qualities, but the best kinds are juicy, have a sweet or luscious and slightly terebinthine taste, and are esteemed by many as little inferior to the pine apple. The pulp of the fruit contains citric acid, gum and a large proportion of sugar. The seeds contain a very large quantity of gallic acid.

USES. This fruit is reckoned very wholesome, and is eaten in the raw state, or boiled with wine, and with

sugar and nutmeg. Various preserves are also made from it, and by fermentation an agreeable ardent spirit may be procured from the juice. In the unripe state it is pickled and made into tarts. Inferior varieties of the mango are used to fatten hogs, oxen and horses. The wood is light, friable, and is used in India along with sandal wood, for burning the bodies of persons in high rank. A species of gum may be procured by wounding the bark of the stem.

THE CITRON.

Citrus Medica.—Aurantiaceæ.—The Orange Tribe.—The citron is a native of Media, and from thence passed into Persia and Greece. Dr. M'Fadyen states that it is the fruit *Hadar*, "the fruit of the tree that is beautiful," mentioned in Leviticus, which the people were directed on the feast of tabernacles, to bring with the young undeveloped leaves of the date-palm before the Lord. This injunction is observed by the Jews at the present day, and great care is taken to distinguish the fruit by its mammillated appearance. This is a shrubby tree, from eight to ten feet high, the fruit is large, sometimes half a foot in length, ovate, with a protuberance at the top, usually nine-celled, each containing two or three seeds. The pulp is white, acid, the rind yellow, thick, hard, irregular, odoriferous, and contains a fragrant essential oil.

Uses. This fruit is seldom eaten in the raw state, but is generally made into confections. The juice is used to flavour negus, punch, &c. The rind is esculent both in the raw state and when made into a preserve. Two very fragrant essential oils, namely, the *essence of citron* and *essence of cedra*, are employed in perfumery.

THE LIME.

Citrus Limetta.—Aurantiaceæ.—THE ORANGE TRIBE.—The lime-tree is a native of eastern countries, but has long been cultivated in the West Indies, on account of its fruit and as a fence. There are several varieties of this tree, which generally attains the height of from eight to fifteen feet. Some kinds of the fruit contain a sweet, some a bitter, and others an acid juice. The variety which contains the acid juice is generally used in this country; its fruit is small and roundish, the rind is thin and has a very agreeable odour. The pulp contains a large quantity of citric acid, which is more pure than that contained in the lemon, and is prepared chiefly from this fruit. It is used in medicine for the same purposes as the lemon, and for the prevention of scurvy. It is generally employed in the preparation of punch on account of its agreeable flavour, and is considered superior to the lemon in this respect. The essential oil named *essence of bergamotte,* is prepared from the rind of the fruit of one of the varieties of this tree, and is a well known perfume.

THE LEMON.

Citrus Limonum.—Aurantiaceæ.—THE ORANGE TRIBE.—The lemon-tree is a native of Asia, and is supposed to have been introduced into Europe about the time of the Crusades. It is now cultivated in the south of Europe, and in most parts of the world within the tropics. This tree is a beautiful evergreen, attaining the height of from twelve to twenty feet in warm climates, but in hot-houses seldom exceeding the size of a large shrub, where, however, under proper management, a large and ripe fruit may be obtained. There are fifteen varieties of lemon, but the two prominent kinds are the egg-shaped with blunt nipples, and

the oblong with large nipples. This fruit is generally smaller than the citron, and is of a straw-yellow colour. The rind consists of two coats, the external being thin, and abounding in an essential oil; the internal thick, whitish and coriaceous. The pulp is acid, divided into cells, from nine to eleven in number, which contain seeds. The finest lemons are smooth and thin in the skin. The juice of the fruit contains a large proportion of water, gum, citric and malic acids. Citric acid, in the state of crystals, is extracted from the fruit by means of lime; and by this process is perfectly freed from the mucilage, &c., which prevents the preservation of the juice, although it is deprived of the agreeable flavour of the latter. The essential oil of the rind, named *essence or oil of lemon*, is generally extracted by expression, but it may also be procured by distillation. It is a fragrant and agreeable perfume, but is generally considered inferior to bergamotte.

Uses. There is very little nutriment in this fruit, and on account of its extreme acidity it is rarely eaten in the raw state, but when the juice is mixed with water it forms a very agreeable acid and cooling drink in febrile affections, &c. Like other acid fruits, it is however objectionable when diarrhœa or any particular derangement of the stomach or bowels is present. A portion of the juice added to water with a little sugar, forms the drink called *lemonade*, which is now manufactured in the aerated state, or impregnated with carbonic acid gas, by means of the soda-water apparatus. The juice or the crystallised citric acid, when added to a solution of bicarbonate of soda, forms a very agreeable effervescing drink, which is useful in checking vomiting or relieving nausea. Half an ounce of the juice, or about 17 grains of citric acid, to 20 grains of the bicarbonate of soda, are proportions which may be employed, with the addition of five or six ounces

of water. Lemon juice has been found very useful in the prevention of scurvy, and on that account is generally used on board of ships destined for long voyages. As it does not keep well in its natural state, it is concentrated by evaporation. Dr. M'Fadyen proposes to preserve it by saturation with lime, and packing it in barrels. The favourite beverage named punch, derives its characteristic properties chiefly from the juice of lemons and limes. When properly made it is not a very intoxicating drink, but is liable to disagree with many persons from its acidity. The rind of lemons is frequently employed in cookery, on account of its agreeable flavour. Lemons are imported into Britain chiefly from Spain and Portugal; those from the former country being generally preferred.

THE ORANGE.

Citrus Aurantium.—Aurantiaceæ.—THE ORANGE TRIBE. —This tree is a native of Asia, but is cultivated in the south of Europe and in all the warmer regions of the world. It attains the height of from twenty to twenty-five feet, and the branches form a spherical figure. Its leaves are beautiful, and of a green colour, the blossoms white, and give out a delightful perfume. There are two principal varieties of this tree, namely, the sweet and bitter orange, which some modern botanists have considered distinct species. The fruit of the sweet orange is of a golden colour, globose in shape, the pulp is white, acid, and sweet, but the Malta or blood orange contains a red pulp. The rind contains an essential oil, similar to that of the lemon, and is divisible into two coats. The juice contains sugar, citric acid, &c.

USES. This fruit contains more sugar than the lemon, and although not very nutritive, is superior to the latter in this respect. It forms a very agreeable dessert fruit

when not too acid, but is liable, when eaten to excess, to produce diarrhœa or derangement of the digestive organs. It is useful in fevers and inflammatory diseases for allaying thirst. The juice only should be swallowed, as the pulpy matter is very indigestible; but it is generally more advantageous, when considerably diluted with water. The fruit is also used in the ripe and green state in forming liqueurs and conserves, and in cookery it is employed on account of its flavour. The kinds of fruit most esteemed are imported from the island of St. Michael, Portugal and Spain. The finest oranges are smooth and have a thin dark-coloured rind.

Citrus Vulgaris.—Bitter or Seville Orange—is of a dark orange colour; the rind is round, uneven, exhales an agreeable odour, and has a bitter taste. The pulp contains a bitter and acid juice, which is composed of a bitter principle, sugar, citric acid, water, &c. On account of its bitter taste, the Seville orange is not used as a dessert-fruit, but is made into preserves of various kinds, which are in general more digestible than jellies. The rind contains an essential oil, similar to that of the China or sweet orange, and this communicates to its preserves their agreeable flavour. The rind, from its aromatic and bitter properties, is an excellent tonic in weakness of the digestive organs, and gives an agreeable flavour to bitter infusions. The small unripe fruit of this tree is used, under the name of *Curaçoa oranges*, for the same purposes in medicine as the rind; but more frequently in the formation of *issue peas*. The Dutch liqueur named Curaçoa, is made by infusing these oranges in brandy, &c.; but also from orange peel, rectified spirits, syrup, &c. The flowers of both the sweet and bitter orange, particularly those of the latter, distilled with water, furnish the perfume called orange-flower-water. The essential oil obtained by a similar process from the flowers of the bitter

orange, is named Neroli oil, and enters into the composition of Eau de Cologne.

THE POMEGRANATE.

Punica Granatum.—Myrtaceæ.—THE MYRTLE TRIBE.—The pomegranate is a native of Barbary, Persia, Japan, various parts of Asia, and it has, for a long period, been introduced into the West Indies and South America. The Jews held this tree in great estimation, it is mentioned in the Bible as one of the fruits of the land of Canaan, and a species of wine seems to have been made from it by this people. It was called by the Romans the Punic apple, because the tree was of Carthaginian origin. This shrub is considered the emblem of democracy. It grows to the height of eighteen or twenty feet in France, Spain and Italy; and in Britain it is cultivated as an ornamental wall-tree; during fine seasons, in the neighbourhood of London, its fruit being of the full size. It has many branches, but seldom a clean stem without pruning, and its flowers are large, beautiful, and have a rich scarlet colour. The fruit is about the size of an orange, globular, and contains numerous angular seeds, enveloped in a rose-coloured very juicy pulp. The juice has a vinous odour, an agreeable, sweetish, acidulous, styptic and cooling taste. It contains acid, mucilage and a little tannin. The rind or outer covering of the fruit is very astringent to the taste, contains much tannin, a little volatile oil, and has been used in the tanning of Morocco leather.

USES. The pulp of the fruit does not contain much nutriment, but is employed occasionally as a dessert-fruit, and is useful for allaying thirst in febrile diseases. A syrup is made from the juice and dried flowers, which is employed in inflammation of the throat. A decoction of the bark of the fruit is used as an astringent in diar-

rhœa, relaxation of the gums, throat, &c. The bark of the root is considered, by the Mahometan physicians, as a specific against the tape-worm; and many European authors have confirmed this opinion.

THE MELON.

Cucumis Melo.—Cucurbitaceæ.—The Gourd Tribe.—The melon is a native of Asia, was introduced into this country from Jamaica, and has been cultivated in England since the year 1570. It requires, however, artificial heat for the ripening of its fruit in this country; and the requisites are a dry atmosphere, a humid soil, and a high temperature. In Persia, melons grow in the open fields, which are intersected by small streams, so that the gardener has only to supply the root with moisture, the other essentials belonging to the climate. This is an annual plant, and there are many varieties. The finest sorts of fruit have a roundish shape, a rough warty skin or netted outer rind, but are not very large. Those which are oval-shaped are considered next in point of excellence. The pulp is juicy, its taste rich and saccharine, accompanied with a peculiar agreeable flavour.

Uses. The melon is not very nutritive, but is considered a very delicious dessert-fruit, and is generally eaten with a little sugar sprinkled upon it. It is apt, in some individuals, to occasion sickness and other symptoms of indigestion; and to prevent this, a little brandy is sometimes added to the pulp. It is not a fruit well adapted for those who have delicate digestive organs.

THE CUCUMBER.

Cucumis Sativus.—Cucurbitaceæ.—The Gourd Tribe.—The cucumber is a native of the East Indies, and was introduced into Britain about the year 1573. It was known to the ancients, and Moses mentions it as abound-

ing in Egypt, when the Israelites sojourned in that country. It is an annual, climbing, and trailing plant, has large rough leaves furnished with tendrils. It is cultivated in forcing frames, as well as extensively about the neighbourhood of large cities in the open fields; but the fruit raised in the latter situations is chiefly used for pickling. There are several varieties of this fruit; but it generally has an elongated shape, somewhat cylindrical, a little crooked, shining, and either smooth or prickly. The pulp has a watery insipid taste, and a disagreeable odour, which disappears on boiling. The pulp of the green cucumber, according to John, contains 97.14 per cent. of water, with a small quantity of sugar, extractive, albumen, salts, &c.

Uses. The cucumber contains very little nutriment, and is not very digestible, being liable, in those who have delicate digestive organs, to produce flatulency and acidity. It is made into stews, sauces, &c., and eaten along with animal food. The green fruit is used as salad, and is salted when half-grown. When young and small, it is preserved in vinegar, and forms a pickle of very common use. In Germany and Poland, half and also full-grown cucumbers are packed in barrels, which are immersed in deep wells; and thus, by the uniform temperature and exclusion of the air, they may be preserved for a year. The pulp of the cucumber has been used as a cooling application to inflamed parts and cutaneous eruptions; and it enters into the composition of a *pomade* for softening the skin.

THE GOOSEBERRY.

Ribes Grossularia. — Grossulaceæ. — The Currant Tribe.—The gooseberry is found wild in England in old walls, woods and hedges, and in Scotland occasionally in the neighbourhood of villages; but it is not certain that

it is a native of Britain. It is, however, indigenous in France, Germany, Switzerland, the Himalayas, and North America. The ancients were not acquainted with this fruit, and it is first mentioned by British authors about the year 1573. It has only been brought into its present improved state since the end of the last century, and chiefly, it is said, by the attention of the Lancashire weavers to its cultivation. It is also cultivated, with great success, in some parts of Scotland, particularly in the Lothians. In Spain, Italy and France, this fruit is little known. The gooseberry is a low, branching, prickly shrub, bearing pendulous, hairy or smooth berries, of a green, yellow, white, whitish-green, or red colour. There are about 300 sorts or varieties. The fruit has a sweet, acidulous, rich and agreeable taste. According to Berard, the ripe green gooseberry contains 6.24 per cent. of sugar, and 81.10 of water, besides malic acid, vegetable fibre, small quantities of gum, albumen, citric acid and lime. The chief difference between ripe and unripe gooseberries consists in the amount of sugar in the latter, which is only ½ per cent., whereas, in the former, it is fully 6 per cent.

Uses. Gooseberries do not contain much nutriment, but when eaten moderately, are wholesome, digestible, and aperient. When taken to excess, particularly by dyspeptics, they are liable to occasion diarrhœa or some derangement of the digestive organs. The soft and saccharine kinds are the most digestible. It forms an excellent dessert-fruit, and is preserved in sugar for that purpose. In small quantities it is well adapted as a fruit for convalescents from acute diseases. When ripe, it is made into preserves, wine, &c.; the unripe is used for tarts, puddings, sauces, creams, &c. Green gooseberries are employed in the manufacture of British champagne; but this beverage wants the delightful flavour of the real champagne.

THE RED CURRANT.

Ribes Rubrum.—Grossulaceæ.—The Currant Tribe.—The currant is found wild in many parts of Britain and Ireland. It is a native of many countries of Europe, north and west of Asia, and North America. It does not appear that the ancients were acquainted with this shrub. It was known in France before the gooseberry was cultivated; but the varieties have been chiefly improved in Holland. In the wild state, and as found on mountains and rocks, the currant is scarcely a foot high, but in gardens it is a large spreading bush, having large leaves. There are about ten good varieties of this fruit, including the white currant. Currants contain the same principles as the gooseberry, namely, sugar, malic and citric acids, gum, &c.

Uses. Currants are similar in dietetic properties to the gooseberry; and are employed in making jams, jellies, wines, &c. The jelly of this fruit, dissolved in water, forms a pleasant drink.

THE BLACK CURRANT.

Ribes Nigrum.—Grossulaceæ.—The Currant Tribe. The black currant is a native of the north of Europe, and in Britain is common in woods, wet hedges, and on the banks of rivers. It is found in Siberia, on the Caucasus, and is abundant in Sweden. It does not appear that the ancients were acquainted with it, and it is not known when it was first cultivated in gardens. The black currant, on its first introduction, was most esteemed as a medicinal fruit, and reckoned tonic, cordial, and diuretic. It is still not much cultivated in England, but is more common in Scotland. In the wild state, it is a smaller bush than the red currant; the wood is smooth and soft, the leaves are

large and soft, and they, as well as the buds, branches, &c. emit, when rubbed, a strong and peculiar odour. The fruit is black when ripe, has a characteristic, slightly astringent taste, and appears to be more mucilaginous than the red currant.

Uses. This fruit possesses similar dietetic properties to the red currant; but is rarely used as a dessert-fruit, being generally made into jams, jellies, &c. The dried leaves are employed to adulterate tea, and are said to communicate the flavour of green tea. In Siberia, the leaves form a chief ingredient in the drink called *quass;* and the berries are fermented with honey, from which an ardent spirit is distilled. An infusion of the young roots is given to cattle, in Russia, as a febrifuge. In the north of Russia, the berries of both the green and black varieties are gathered in the woods, dried in the sun or in an oven, laid up for winter use, and used for making tarts, or in the cure of sore throats. In Scotland, black currant jelly is reckoned a sovereign remedy for a sore throat. When dissolved in water, like other acidulous jellies and preserves, it forms a pleasant drink.

THE STRAWBERRY.

Fragaria Vesca.—Fragariaceæ.—The Strawberry Tribe.—This plant is a native of Europe, north-west coast of America, and is abundant in Britain in woods and on hills. The varieties of this fruit are very numerous, and it differs in size and colour, the latter being red, white, and black. Strawberries have not been particularly analysed, but they have been found to contain malic and citric acids, a volatile matter soluble in water, and which may be distilled along with it. This has been called *strawberry water*, and it has the agreeable odour of the fruit.

Uses. The strawberry has a delicious, saccharine, and

acidulous taste, and is one of the most esteemed dessert-fruits. It is not very nutritive, but very digestible and wholesome, and less liable to produce derangement of the digestive organs than many other fruits, if soft and saccharine in quality, and not indulged in too freely, or united with too much sugar and cream. It is believed to be somewhat diuretic, and was formerly prescribed for gout and calculous diseases. The root is astringent, and contains a portion of tannin. A decoction of it was formerly used for the cure of diarrhœa.

THE RASPBERRY.

Rubus Idæus. — *Fragariaceæ.* — THE STRAWBERRY TRIBE.—This shrub is a native of Europe, Asia, Africa, and America, is very abundant in Britain and Ireland in woods and moist wastes. It attains the height of three or four feet; the fruit, in the wild state, is of a crimson colour, and consists of numerous juicy grains united together into a round berry. There are about twenty good varieties cultivated, and the fruit has a white, yellow, or red colour. The raspberry has recently been analysed by M. Bley, and has been found to contain essential oil, citric and malic acids, red colouring matter, crystallisable sugar, insoluble mucilage, vegetable fibre, salts of potass and lime, and water.

USES. The raspberry has a fragrant odour, an acidulous, saccharine, agreeable taste, and it is very wholesome and digestible. In France, this fruit is frequently eaten at table along with strawberries; and a cooling drink is made by bruising them in water, with the addition of a little sugar. They are employed in the composition of jams, jellies, ices, syrups, &c.; to which they communicate a delightful flavour. A wine is also made by fermenting them alone or mixed with cherries and currants, from which an ardent spirit may be procured

by distillation. In Russia, an agreeable *hydromel* is made from honey, raspberries, and water fermented together. Raspberry vinegar and raspberry brandy are made by infusing the fruit in these liquors. Raspberry vinegar, mixed with water, is often used as a drink in febrile affections, and during summer to allay thirst; but, from its great acidity, &c., it frequently causes derangement of the digestive organs. Raspberries may be preserved for winter use, in bottles or jars, with or without sugar.

THE BILBERRY.—BLAEBERRY, *Scotland.*

Vaccinium Myrtillus.—*Vaccinieæ.*—THE BILBERRY TRIBE.—This shrub is a native of the northern parts of Europe, Asia, Africa, and Nova Scotia, and is abundant in Britain on heaths, stony moors, and mountain woods. It attains the height of from six inches to two feet; the berries are about the size of the red currant, have a bluish-black colour, are covered with a mealy bloom, contain a purplish-coloured juice, and have an agreeable, sweet, and acidulous taste. The juice contains malic and citric acids, sugar, albumen, gum; and it has less tendency to ferment than the juices of many other berries.

USES. This is a very wholesome and digestible fruit, and is eaten alone, with cream, or made into tarts, jellies, &c. The juice stains the mouth, lips, &c., of a purple colour, and the colouring matter is not destroyed by digestion, so that the urinary and excrementitious discharges acquire a blue or black colour. The juice has been used to stain paper or linens of a purple colour; and the leaves have been employed in tanning. During autumn, the wood-game live chiefly on the products of this shrub.

RED WHORTLE BERRY.—COWBERRY.

Vaccinium Vitis Idæa.—Vaccinieæ.—THE BILBERRY TRIBE.—This shrub is a native of the north of Europe, is abundant in Scotland in dry, barren, stony woods and heaths. It is about six inches in height, the berries have a blood-red colour, an acid, austere, and a slightly bitter taste. This fruit is not eaten in the raw state, but is made into pies, &c. In Sweden, a jelly is made from it, which is eaten with roast-meat, and is reckoned superior to red currant jelly as a sauce for venison. The jelly is also used in Sweden for sore throats, colds, &c. In Siberia, the berries are fermented with barley, rye, or honey, and a wine or spirit is the product. Sweetmeats are made from them, with sugar or honey, which are used in Moscow at balls and assemblies. In Sweden, the plant is used in gardens for edgings, as box is employed in this country. The red whortle berry is the badge of the clan Macleod. (Hooker.)

THE CRANBERRY.

Oxycoccos Palustris.—Vaccinieæ.—THE BILBERRY TRIBE.—This creeping shrub is a native of the mountainous parts of Europe, and is abundant in Scotland, England, Ireland, Switzerland, and Russia, in turfy mossy bogs. In consequence of the extensive drainage of bogs, this plant is now cultivated; but England is chiefly supplied with cranberries from Russia and Sweden. They are also imported from America; but those belong to another species, the *oxycoccos macrocarpus*, are larger and have a brighter red colour. The berries are pear-shaped, globular, of a crimson colour, often spotted, have a grateful, peculiar, and very acid taste. This fruit has not been analysed, but Scheele has

found the acid contained in it to be chiefly the citric, with very little malic acid.

Uses. Cranberries have been used in Britain and the north of Europe for making tarts, and an acid drink during summer, from time immemorial; but are not very digestible, from the large quantity of acid they contain. They may be kept for several years, if gathered when dry, and put into bottles closely corked; or they may be preserved in casks of water, which is the method practised in the north of Europe and America for exportation. In Russia, the bankers whiten their silver coin by boiling it in cranberry-juice, and in Sweden the latter is also employed to whiten silver-plate. Russian are considered superior to American cranberries. The total quantity imported from both countries is from 30,000 to 35,000 gallons annually. (M'Culloch.) This fruit is the badge of the clan Grant. (Hooker.)

CARRAGEEN, OR IRISH MOSS.

Chondrus Crispus.—Algaceæ.—The Sea-weed Tribe. —This fucus is found abundantly in Ireland, and on many parts of the British coast. When recently gathered, it has a glossy reddish-purple colour, but when dried it is horny in appearance, generally curled, having a whitish-yellow or brownish tint, a slight odour of sea-weed, and a mucilaginous slightly saline taste. When put into water, it absorbs this liquid very rapidly, becomes white and gelatinous. According to Herberger, it contains 79 per cent. of vegetable jelly, which is supposed by some authors to resemble animal jelly, mucus, two resins, fatty matter, free acids and salts; but no traces of iodine or bromine. When boiled with water, it furnishes a very consistent jelly, which preserves its shape for a long time; but after the lapse of four or

five days, there is developed in it a very slight fishy odour.

USES. Irish moss is a very digestible and agreeable species of food; and within the last ten or twelve years has attracted some attention as a substitute for arrow-root, sago, &c., which it appears to equal in nutritive and other qualities. It has long been highly esteemed by the peasantry on the western coast of Ireland as a dietetic remedy for consumption, diarrhœa, scrophula, and diseases of the kidneys; and as an alimentary agent, is well adapted for the treatment of these diseases. When taken as ordinary diet, it is generally eaten in the solid form, or converted into a shape; but for medicinal purposes, particularly with children, the liquid form is more convenient. In the latter case, the following formula of M. Beral may be adopted. He names the preparation analeptic or restorative milk. Take milk 24 ounces, Irish moss 4 scruples, sugar ½ ounce, canella or cinnamon 20 grains. Macerate the moss in cold water for a few minutes, then shake the water out of it, and boil with the milk, sugar, and cinnamon, until the liquid attains the consistence of warm jelly. In order to give the jelly a consistency sufficient to make it retain its shape, the proportion of moss must be increased. ½ ounce Irish moss, and 1½ pints of new milk, boiled together for a short time, are the proportions frequently employed. Various seasonings are added, according to the taste of individuals, such as wine, cloves, mace, cinnamon, lemon or orange juice, sugar, &c.; but when the digestive organs are weak, acids and much sugar should be avoided. Irish moss is also used to furnish size for water colours, by the inhabitants on the coast of Ireland.

ESCULENT SEA-WEEDS.—The *algæ* or sea-weeds are aquatic vegetables, which contain a considerable quan-

tity of nutriment, namely, vegetable jelly, albumen, &c.; and several of them are used as food by the poorer classes in Ireland, Scotland, Iceland, Denmark, &c. *Rhodomenia palmata*, the dulse of the Scotch, and the dillesk of the Irish; *porphyra laciniata et vulgaris*, or laver; and *alaria esculenta*, bladder-locks or honey-ware, are frequently used as aliment, being boiled or stewed, and eaten with milk, farinaceous substances, or seasoned with aromatics.

ICELAND MOSS.

Cetraria Islandica.—Lichenaceæ.—The Lichen Tribe.—This lichen is found in the mountains and woods of the alpine districts of Great Britain. It also grows in the north of Europe, and thrives well upon the lava on the western coast of Iceland. Iceland moss is erect and bushy, seldom exceeding three inches in height. The fronds are somewhat cartilaginous, variously sinuated, notched and fringed at the margins with hairs. The surface is of a brownish or greyish white colour; when wet it assumes a green tinge. The taste is mucilaginous and very bitter, and it is tough and without odour; According to Berzelius, it contains chlorophyl 1.6, bitter principle 3.0, uncrystallisable sugar 3.6, gum 3.7, extractive 7.0, starch 44.6, bilichenate of potash and lime 1.9, amylaceous fibrin 36.2. The bitter principle has been procured in a state of purity by Herberger. It is a white powder like magnesia, and has an intensely bitter taste.

Uses. This vegetable is of great importance in northern countries during periods of scarcity, for it is very nutritive, a ton of Iceland moss being estimated as equal to half a ton of wheat. The Saxon government published a report upon this subject a few years ago, from which it appears that the use of *lichen meal* and flour produces a much greater quantity of bread, than

what would result from the employment of an equal weight of the latter. A fallacious conclusion may be drawn from this statement; for this, like sago bread, absorbs much more water than that manufactured from flour, and hence must be less nutritive in proportion to its weight. The extremely bitter taste of this moss has, however, been always found a very great objection to its use as an article of diet; and unless some attention be given to the removal of this disagreeable quality, an unconquerable dislike to it is the result. The bitter principle may, however, be removed almost completely by subcarbonate of potass *(salt of tartar)*; and more thoroughly by the same salt deprived of its carbonic acid by means of quicklime. I have found by experiment, that 5 parts of subcarbonate of potass, deprived of its carbonic acid by an equal weight of quicklime, and dissolved in water, are sufficient to extract the bitter principle from 100 of Iceland moss, after maceration for ten or fourteen days. When the maceration is completed, the lichen should be washed with pure water, and simply allowed to drain; for straining by pressure tends to press out a portion of the gelatinous or starchy principle. Quicklime is also very efficacious in extracting the bitter principle from Iceland moss, and is more economical than potass; 1 part of lime to 8 parts of the moss, with the requisite quantity of water, are the necessary proportions. The maceration ought to be continued for about eight days, frequent agitation being employed during that time. It should be afterwards well washed with cold water, and then with water acidulated with sulphuric acid. This process deprives Iceland moss of its peculiar odour more effectually than potass. This vegetable has been employed for more than two centuries in affections of the chest, particularly in pulmonary consumption, and has been recommended by various authors in catarrh,

inflammation of the lungs, diarrhœa, hooping cough, &c. It is rarely prescribed in modern times, except as a palliative for consumption. The bitter principle is calculated to improve the tone of the digestive organs, and may thus be advantageous in many diseases; but, when thoroughly extracted, this moss simply acts as an alimentary agent, and forms a moderately nutritious and agreeable diet, if seasoned with sugar, milk, or aromatics. When medicinally employed it is sometimes given in the form of powder, or added to soups or chocolate. It is used in brewing, and in the composition of ship-biscuit, and it prevents the latter from being attacked by worms, &c. The bitter principle or *cetrarin* has been lately recommended as a tonic and febrifuge in ague, in the dose of one or two grains.

MAMMIFEROUS ANIMALS.

THE COMMON OX.

Bos Taurus.—Bovidæ.—The Ox Family.—This animal is found, in some of its varieties, in almost every part of the world, and is of the first importance on account of its uses and services in field labour. It is capable of being acclimated all over the world, and it thrives well on almost any soil, the quantity being more essential to it than the quality of the food. The richness of the pasture, however, has a great effect in increasing its size, and those which feed on mountainous districts are generally small, which characters are well observed in the Devonshire and Shetland breeds. Numerous varieties are reared in this country, and many of these are believed to be descended from an admixture with the wild oxen which

occupied Britain at no very remote period. Very great attention has, for a considerable time, been paid to the improvement of the breed of this animal, and the variety as well as the value of its products will sufficiently account for this. The cow furnishes milk, butter and cheese, and the flesh of the ox is esteemed all over the world. The number of oxen consumed in this country must be very great. Mr. Donovan states that about a thousand oxen and calves are used in London alone every day.

Almost every part of the ox is used as food by man, but the muscle or flesh is most esteemed. The flesh of the bull is exceedingly dense and tough, and is not much used as aliment, but when eaten is chiefly employed in the formation of sausages. The flesh of the cow is much more tender, but is greatly inferior in this quality, as well as in richness and sapidity to that of the ox, which is generally believed to be in perfection at the age of four years. The flesh of the calf is much softer in texture, and contains a larger proportion of gelatinous matter than that of the full-grown animal. Water, therefore, extracts more soluble matter from veal than from beef; hence the soup formed from the former will contain a larger proportion of solid ingredients.

According to Berzelius, beef consists of fleshy fibre, vessels, nerves, cellular tissue, albumen, colouring matter, extract, salts, and water. Meat devoid of fat contains 26 per cent. of dry residue, and nearly 13.6 of carbon. Fat and cellular tissue form one-seventh of the weight of ordinary meat, and fat contains 80 per cent. of carbon. (Liebig.)

Water extracts from hashed meat about 17 per cent. of its weight. (Graham.) The weight abstracted consists of water as well as solid matter, for water extracts a much smaller proportion from thoroughly dried meat.

Uses. Beef, when tender, not too fat, and properly

cooked, is very digestible, agreeable, and preferred by many persons to other kinds of animal food. It is stated by some authors that beef is more easily digested than veal. This statement may be true with respect to those persons who have weak digestive organs; for if the veal be very young or gelatinous, it is apt to produce fermentation in the stomach and the formation of lactic acid.

In healthy individuals, however, the flesh or *muscular parts* of the young, being tender in texture, will be more easily digested than that of the full grown animal. The digestibility of beef depends not only upon its own intrinsic qualities, but also upon the time it has been kept. Thus, during hot weather, a day or two will effect the necessary tenderness of texture; while, during winter, eight days are often required. Various other parts of the ox are used as aliment, such as the kidney, heart, and tongue, which are generally tender and very digestible. The stomachs also, when thoroughly boiled and made into the dish named *tripe* in Scotland, are favourites with many persons, and are very light and easily digested. Animal food, particularly the flesh or muscular parts of animals, is universally admitted to be more nutritive than vegetables, even than those of the highest alimentary power, such as wheat, &c. This cannot be owing to the quantity of solid matter in beef when compared with that in wheat; for meat devoid of fat contains only .26 per cent. of dry residue, whereas in wheat there is only about 10 or 12 per cent. of water, the rest being nutritive matter. The high nutritive power of animal food must therefore depend upon the presence of some principle, in greater amount than is found in vegetable substances. This principle is nitrogen or azote, and when presented to the stomach in the form of fibrin or muscular fibre, is highly calculated to nourish the body, particularly the fleshy organs, as believed by some

modern philosophers. Carbon is also a constituent of the fleshy parts of animals, and meat deprived of fat contains nearly 13.6 per cent. of carbon; but as many vegetable substances contain a much larger proportion of this element than meat, the superiority of the latter cannot be owing to its presence. For example, potatoes contain nearly as much carbon as meat, namely, 12.2 per cent.; bread contains about 30.15 per cent. When the amount of carbon is very great, however, the nutritive power of the animal or vegetable substance, if alimentary, is generally also very considerable, although by no means to the same extent as when it contains nitrogen in addition to this element. Thus fat, which is considered very nutritive, in as much as it tends to produce obesity in healthy individuals, contains 80 per cent. of carbon. Tallow or the fat of the ox is used extensively in the manufacture of soap and candles. The skin or hide is converted into leather by the process of tanning.

Beef-tea—is prepared by boiling, in a pint of water, from four to eight ounces of lean beef, cut into thin slices, for a quarter of an hour. When it is necessary to remove the whole of the fatty matter, the beef-tea must be cooled, and strained through a linen or cotton cloth; for when warm it cannot be completely removed by skimming. This preparation may frequently be seasoned with salt, spices, &c.

MILK.

Milk is a fluid secreted by mammiferous animals, and is evidently intended for the nourishment of the young, as it is formed immediately after their birth. The milk of the cow is a white opaque liquid, of a sweetish, bland and agreeable taste. It is heavier than water, and its specific gravity is generally about 1.030, but it varies considerably in different animals and at different periods

of lactation. When deprived of its cream, its specific weight is two or three degrees higher. Milk, when recently drawn, is alkaline, and when examined by the microscope, very minute globules are seen floating in it. According to Raspail, the largest of these measure about 1-2500th part of an inch in diameter, consist of butter, and disappear on the addition of a caustic alkali. When milk is allowed to remain at rest for a few hours, the cream or oily portion rises to the surface, in combination with a small portion of the curd or caseum. After this is removed, the milk that remains is named *skimmed milk*, and it has a slightly bluish colour. When the cream is made to undergo the process of churning, the particles of fatty matter unite together, forming butter, and the curd remains suspended in the serum or whey, constituting what is named *butter-milk*. According to Henry and Chevallier, the milk of the cow contains caseum or curd 4.48, butter 3.13, sugar of milk 4.77, salts 0.60, water 87.02. Its solid or nutritive contents are about 13 in 100 parts. Milk drawn at the end of the same milking is more rich in nutritive matter than that procured at the beginning. Milk unites with water nearly in all proportions. Spirit of wine, acids, and several other substances coagulate it, while potash, soda and ammonia have no such effect; but on the contrary dissolve the curd when it has formed. When milk is kept for a certain time, varying according to the temperature, it becomes acid, and is coagulated, from the formation of lactic acid or the acid peculiar to milk. The peculiar kind of food given to cows and other mammiferous animals, influences both the quantity and quality of the milk. Thus turnips, carrots and beet-root, furnish a very abundant and rich kind of milk. Chevallier and O. Henry are of opinion, that beet-root is productive of a sweeter and better flavoured milk than many other vegetables. When an animal is much

fatigued with exercise or labour, the milk is always deficient in solid parts and is consequently less nutritive. After parturition, the milk first formed possesses peculiar properties. It is named *colostrum*, *first milk*, and *beist* in Scotland. It has a yellow colour, is acid, viscous, its flavour being unsavoury and sometimes bitterish in taste. It is coagulated by heat, becoming somewhat gelatinous, and contains more butter and curd, and its density is greater than ordinary milk, being often 10.50 or 10.60 in specific gravity. It is to a certain extent laxative in its effects, but this quality is lost at the end of some days, when it assumes the usual properties.

Milk sometimes acquires peculiar properties from the kind of food the animal uses. Dry substances and astringent vegetables, have a tendency to give the milk an astringent property; while green vegetables, such as turnips, carrots, beet-root, &c., render it relaxant. Cows fed on turnips are well known to furnish milk of a disagreeable taste. Some authors state that this can be prevented by the careful removal of the green tops of this root. Boiling turnips thoroughly is practised in some dairies, and is said to be quite efficacious. This plan is very rational, for water at a boiling heat dissipates the acrid principle of cruciferous plants. The addition of a little saltpetre to milk infected with the turnip-flavour, renders its taste less disagreeable. The colour of milk is modified by the exhibition of madder, saffron, &c.; the odour and taste by plants of the alliaceous or garlic tribe, and wormwood communicates its bitter qualities to this secretion. Chevallier and O. Henry have ascertained by experiment, that the following substances pass into the milk of the ass, namely, common salt, bicarbonate of soda, glauber salts, hydriodate of potass, and the oxides of iron, zinc and bismuth. Mercury has not been detected by the most careful analysis, but there is a strong probability of its

existence, from the purgative effects of nurses' milk while under the influence of this metal. M. Virey mentions that in the state of Tenessee, North America, a poisonous plant is eaten with impunity by the cows, but the milk procured from them causes vomiting, vertigo, &c. M. T. A. Quevenne has remarked that the milk of Paris is inferior in flavour to that produced in the country, when the cow feeds on the ordinary grasses. This fact is generally known in this country, particularly by the inhabitants of large towns. It has also been stated that normal or healthy milk is alkaline, when the cow feeds on natural grasses in the open air; whilst in seclusion and fed on turnips, beet-root, &c., it is often acid. The milk therefore from the former ought to be preferred, particularly by persons who have weak digestive organs. Milk or cream may be preserved by evaporating the half of its watery contents in a water bath, putting it into bottles, exposing these to the boiling water-bath, and carefully corking and sealing them.

ADULTERATION OF MILK.—The most common adulteration of milk is with water; but flour, sugar, gum and eggs are occasionally, though, I believe, rarely in Britain used for this purpose. For the detection of water a hydrometer or lactometer may be employed, which will show the density. Thus, if the specific gravity, according to Quevenne, be below 1029 or above 1033 for uncreamed milk, or below 1033 and above 1037 for skimmed milk, there will be reason to suspect the addition of water; which opinion may be further corroborated by the peculiar watery taste and bluish tint of the milk. The quantity of cream which any sample of milk contains may be ascertained by an instrument divided into degrees; and various have been recommended by scientific authors. An instrument of this kind is rarely used; for the majority of dairymaids

believe themselves capable of appreciating pretty exactly the quantity of cream thrown up by milk. The albumen of eggs is detected by boiling the milk, which forms coagula if this be present, but flocculi only if its quantity be small. Sugar, if considerable in quantity, may be detected by the taste; but certainly by adding a little yeast, which causes a brisk fermentation in a few hours; whereas the fermentation of pure milk, when excited by this agent, is difficult and slow. Flour, rice, and other grains are boiled in water, and sometimes added to milk, but perhaps more frequently to cream, to increase its consistency. The smallest quantity of these farinaceous substances is detected by the blue colour produced on the addition of the tincture of iodine, particularly if the milk be coagulated, and the whey tested. Gum is, in general, too high in price to be used for the adulteration of milk. The emulsion of almonds or hemp-seed generally communicates a peculiar taste to the milk, and is often partially coagulated by boiling. The curd procured from such mixtures is small in quantity and oily in its nature, and it imparts to white paper a greasy stain. Almonds are most decidedly detected, according to Quevenne, by the addition of a small portion of *amygdaline*, which developes the odour of the oil of bitter almonds. In almost all these adulterations, the specific gravity is too low; so that the hydrometer may also be applied in their detection. According to Soubeiran and O. Henry, milk is adulterated in Paris with the brain of the calf and sheep. In this case, by the aid of the microscope, fragments of vessels are detected in the liquid. Carbonate of soda is also occasionally added to milk to prevent its coagulation by heat, and to neutralise any acid that may be formed. When used in small quantities, its wholesome qualities are not injured; but when added in considerable amount to very acid milk,

the latter acquires purgative properties. This adulteration increases the specific gravity of the milk, and the latter has a peculiar, more or less saline taste.

DISEASED MILK.—It has already been noticed that the *first milk* differs from ordinary milk in several important particulars; and though perfectly suited for the nutriment and state of the young animal, it is not well adapted for general use as food. It cannot strictly, however, be characterised as diseased milk. Milk sometimes contains mucus, pus, blood, &c., when the cow has become affected with particular diseases. These foreign matters may be detected, by the aid of the microscope, from their shape, colour, &c.; and blood is sometimes found at the bottom of the vessel in which milk is contained. There is reason to believe that this fluid is rarely impregnated with such principles, or even so altered by disease as to be injurious to the health. The following characters may be given to genuine milk. It should not be viscid; when uncreamed it ought to contain only spherical globules, and the specific gravity should be between 1029 and 1033; it should not become thick when mixed with ammonia, nor be coagulated by heat. A disease, named *cocote*, prevailed two or three years ago among the cows reared in the vicinity of Paris; and gave rise to a series of important examinations into the quality of the milk furnished by these animals. In a report upon this subject to the Academy of Sciences, the following characters are given as the most certain for distinguishing it from healthy milk, namely, deficient homogeneity, mobility and liquidity; a thickening by ammonia; and the presence of globules which are not present in normal milk.

USES OF MILK. Good milk is a very important article of diet, as it furnishes to a healthy individual a very digestible and nutritive aliment, and has been valued as

such by all nations. It is generally more or less coagulated by the gastric juice before digestion takes place; and is thus subjected to the same law, in the stomach, as solid aliment. In some dyspeptic persons, who are liable to acidity, it is apt to assume the acid fermentation, particularly during summer, when the milk is more or less sour before it is used. In such cases, it may advantageously be diluted with water, to which a small portion of bicarbonate of soda has been added; or used in very moderate quantities, along with other less fermentable aliments. Milk is often used along with farinaceous food, such as bread, arrow-root, sago, &c.; and this combination, in general, agrees with most individuals. When acidity, however, is liable to occur, the farinaceous or amylaceous substance should be boiled with water, to which a little salt has been added, and eaten with milk. As a general rule, skimmed milk, when quite free of acidity, is lighter and more easily digested than that which contains its cream. Milk is sometimes boiled before use; and, in this state, is considered, by some authors, more beneficial in diarrhœa and other affections of the bowels. It is doubtful whether this opinion be correct; boiling, however, can do no injury to the dietetic properties of milk, and is a good test of its genuine quality; for good milk is not coagulated when exposed to a boiling temperature. Milk is often used as aliment in cases of consumption; and when it agrees with the digestive organs, is well adapted for its treatment, on account of its nutritive and little exciting properties. It is also valuable as an antidote or demulcent, in poisoning with corrosive sublimate, sulphate of copper, muriate of tin, the mineral acids, &c.

CREAM AND BUTTER.

Cream is lighter or of less specific gravity than milk, being generally about 1024; and its upper portion is

richest in butter, while the lower contains the larger proportion of curd. During hot weather, milk throws up its cream in about twenty-four hours; whereas during winter, thirty-six or forty-eight hours may elapse before this process is accomplished. The first portion of cream rising to the surface is richer than that obtained in the second equal space of time. Milk agitated and cooled before it is put into the milk-pans, throws up less cream than when it is early put into proper vessels. When milk is boiled, the cream appears more slowly, occupies less volume, but is richer in butter. The average quantity of cream separated from milk is only about 4 per cent. according to some experimenters. In the conversion of cream into butter the former is generally kept until it has become somewhat acidulous; and it is stated that the process of churning is by this means considerably facilitated. When the acid is deficient in quantity, some writers have recommended the addition of vinegar to the cream. During churning the heat rises, it is said, a few degrees; and the temperature best adapted for quickening the process, as well as for producing a fine quality, is between 50° and 57° Fahr. Summer cream yields rather less butter than that procured during the autumn months; and what is made during the latter period is best adapted for storing. After the butter is churned it is washed with water, and the milk is forced out with a wooden ladle.

Butter is sometimes artificially coloured during winter, by means of carrot-juice or annotto, which addition, although quite unnecessary and even sometimes injurious to its appearance, is not detrimental to the health, if free from adulteration. Butter is generally preserved by a mixture of common salt, saltpetre and sugar; and when these are properly incorporated with butter of good quality, and completely freed from milk, it may be preserved for years in a sound state.

ADULTERATION OF BUTTER.—This practice is by no means unfrequent; and during the years 1839 and 1841 a very large quantity of adulterated butter was imported into Glasgow from Ireland. It is named "*repacks*," and is made by boiling common salt and flour with water and mixing the liquid thus formed with the butter. This sophisticated butter is dingy in colour and is not semitransparent like that of genuine quality. This adulteration is detected by liquifying the butter with heat, and allowing it to remain in the fluid state for some time. The butter is found at the top, and the flour and water below. The tincture of iodine when added to the liquid containing the flour, produces a deep blue colour.

USES OF CREAM AND BUTTER. Butter possesses the general properties of other oily aliments, being very nutritive, but difficult of digestion. As it contains, however, a small portion of milk and curd, it is more easily assimilated than pure oil or fat; and it possesses the advantage of being exceedingly agreeable. Dyspeptics ought to use it only in small quantities, and mixed up with some other alimentary substances of easier digestion. When rancid or rendered empyreumatic by heat, it ought to be avoided. Butter enters as a constituent into many culinary and confectionary preparations, which are thereby rendered more or less difficult of digestion. Cream possesses dietetic properties similar to butter; but the fatty matter being less concentrated, it is lighter and not so apt to produce indigestion as the latter.

BUTTER-MILK.

Butter-milk is generally prepared by churning sour cream; but is also procured from milk that has become acid. When procured from the first, it is more rich, nutritious and agreeable than when made from the second. The acid which it contains is the lactic or acid of milk.

Butter-milk is a very good alimentary liquid for a healthy person, although not so nutritious as sweet milk; and is much used by the peasantry of Scotland and Ireland. On account of its acid properties it is not well adapted for those who have delicate digestive organs; as it is liable to occasion flatulency, acescency and sometimes diarrhœa. As a drink or diluent, for which purpose it is often employed, the most robust should only use it; and even for them, if not previously done by the maker, it may advantageously be diluted with water. It has been recommended in fevers and other febrile diseases, on account of its cooling properties, but it is not well adapted for their treatment; as it often deranges, to a greater or less extent, the functions of the stomach and bowels. It may, however, be used as a safe and pleasant drink, under ordinary circumstances, if modified by a mixture with an equal portion of boiling water. The boiling water coagulates the caseum or curd, which falls to the bottom, while the diluted whey swims above and may be decanted. A little oatmeal, beat up with the milk before the addition of the water, improves the flavour of this diluent.

WHEY.

Whey is the liquid or watery part of milk which remains after the curd has been separated. It contains sugar of milk, lactic acid, some salts, and frequently a little butter and curd. The sugar is the ingredient which gives whey its agreeable taste; and in Switzerland, the former is extensively manufactured by evaporating the latter to the consistency of syrup. Sugar of milk is sweetish in taste, gritty, and much less soluble in water than common sugar. It is capable of a slow fermentation; and the Tartars prepare a vinous liquor from the milk of the mare. Its crystals are granular; but in

commerce it is generally found in cylindrical masses. It is used in place of common sugar, but is greatly inferior in sweetness.

Uses. Whey contains little nutriment, but forms a very agreeable drink, and is gently aperient; although this effect is not frequently observed. When too rich, it may be diluted with water; more particularly if used in febrile affections, or when there is any tendency to indigestion.

CURD.

When rennet, acetic or any of the mineral acids is added to milk, it is coagulated, and the curd formed is named caseum. This curd is an albuminous substance, resembling white of egg in many of its properties; although it is not, like it, coagulated by heat. It is transparent, yellowish, has little odour or taste, and is sparingly soluble in water. It is occasionally used in diet, under the name of *curds*, which are generally eaten with cream. When taken alone or with little cream, by a healthy individual, they are nutritive and digestible; but when combined with much of the latter substance, or taken to excess, are productive of indigestion, flatulency, and not unfrequently diarrhœa.

CHEESE.

Cheese is made from the curd or caseous part of milk. The milk is first coagulated by rennet (an infusion of the fourth stomach of a calf), the curd is then separated from the whey, chiefly by draining, and afterwards subjected, in a mould, to strong pressure. There are various kinds and qualities of cheese, which, in a great measure, depend upon the nature of the milk or the mode of manufacture. When the cream has been completely separated from the milk before its coagulation, the cheese

formed from it is almost pure curd, being very tough, and difficult of solution in the stomach. On the other hand, when the cheese is made from uncreamed milk, it is more rich, less tough, and though it contains butter, is more digestible, being more easily disintegrated and dissolved in the stomach. For the sake of economy, the cream is sometimes abstracted, and a portion of other fatty matter, such as lard, is added to supply its place. This plan is most probably injurious, both to its agreeable qualities and digestibility. Cheese is also sometimes made from cream alone; and must consequently prove very heavy and difficult of digestion. Cheese, when moist and partially spoiled, is liable to become the depository of maggots; these are most readily destroyed by pouring a little ardent spirit upon them. *Mites* are also generated in great abundance in old cheeses; but are not in general disliked, although they often commit very extensive depredations. The most effectual means of eradicating this evil, is the complete removal of the *mity* from the sound parts. When cheese is kept for several years, it acquires new properties, becoming brittle, pungent to the taste, exhaling a strong and sometimes an ammoniacal odour, and assuming an irregular, greenish, yellowish or brownish tint. It is then much more digestible when eaten in small quantities; and is generally considered somewhat condimentary in its properties. When cheese is very old, and in a state of putrefaction, it contains acetate of ammonia, acetic acid, various salts, a peculiar extractive matter, and a bitterish crystalline principle named *aposepedine*. This, and the ordinary changes of cheese, occur more speedily after it has been cut or broken, from the more free action of the air upon it. Cheese has sometimes been found adulterated with deleterious substances, such as lead, and has thus proved poisonous. This,

however, has generally been owing to the adulteration of the annotto, used in colouring the cheese, with red lead. Britain, Holland, Switzerland and Italy, are the countries most celebrated for the manufacture of cheese.

STILTON CHEESE—is made in the county of Huntingdon. It contains a large proportion of cream, and when old becomes greenish. Its flavour is much admired, and though rich and somewhat difficult of digestion, yet it is soft and easily disintegrated.

CHESHIRE CHEESE—also contains cream, and though its flavour is not so much esteemed as that of Stilton, it possesses similar properties.

PARMESAN CHEESE,—according to Dr. Willich, is made from creamed milk, and the curd is coloured with saffron.

GRUYERE CHEESE—is made in Switzerland, contains very little cream, but is remarkable for its fine flavour, the sweet whey contained in small spheroidal cavities, and the large size of the cheeses. Captain Brown states that it contains a portion of sow's milk.

GLOUCESTER CHEESE.—In the manufacture of this cheese, rennet is added to the milk as soon as it is procured from the cow. There are several qualities; but it is generally rich, agreeable, and reddish in colour.

AYRSHIRE OR DUNLOP CHEESE—is made from uncreamed milk, and rennet is added before it is quite cold. When two or three years old, its taste is pungent and agreeable, it is moderately friable, and pretty easy of digestion. It is equal to several varieties of esteemed English cheeses.

EWE CHEESE—is now rarely made in Scotland. It is very rich when genuine, dark-coloured, when old extremely pungent, and in small quantities easily digested and rather condimentary.

DIETETIC QUALITIES OF CHEESE.—Cheese is very nutri-

tive, but somewhat difficult of digestion, particularly when tough, hard, or rendered tenacious by heat. It is therefore only suited to the robust and healthy, and is by no means adapted for those who have delicate digestive organs, except in small quantities, and old cheese should be preferred. It is rendered more easy of digestion when grated, for in this state it is more readily mixed up with other alimentary matters, and is thus more quickly dissolved by the gastric juice. Cheese is liable to produce constipation, particularly when new, and made from creamed milk. When hard, cheese should either be grated or softened by maceration in milk or other alimentary liquid.

VARIOUS KINDS OF MILK.

MILK OF THE HUMAN SUBJECT.—This differs from that of the cow, in containing more sugar and cream, and less curd. The curd is generally not capable of precipitation by acids; although readily by rennet. Its specific gravity varies between 1030 and 1035; and the density increases as the age of the milk advances, but only up to a certain period, after which it remains the same. When procured from a healthy person it is slightly alkaline or neutral, and the proportion of solid matter is from 11 to 12.5 per cent. Sir Astley Cooper has estimated the quantity of cream as varying from one-fifth to one-third by measure. The *colostrum* or first milk is very apt to become acid and viscid on exposure to the air. According to Chevallier and Henry, the ordinary milk contains *caseum* or curd 1.52, butter 3.55, sugar of milk 6.50, salts 0.45, water 87.98.

This fluid, as has been already fully explained in treating of the diet of infancy, was intended for the nourishment of infants, and no other aliment requires to be given for several months, if abundant and of good quality.

This, however, is frequently not the case, for the artificial mode of living so prevalent in civilised countries is not well calculated to promote healthy secretions. A nurse ought to be a person in perfect health, with sound digestive organs; for if she be liable to acidity or flatulency, her milk will be apt to produce a similar state in the infant. Her diet should be simple, moderately full, and may contain an average proportion of animal substances. As a larger proportion of liquid is required than under ordinary circumstances, milk, soups, &c., are proper; but in general malt liquors may be dispensed with, as being unnecessary, and frequently liable to generate an acescent milk. There are some exceptions to this rule, where sound porter is found beneficial. Wine or ardent spirits ought to be used in very moderate proportions; for there is no doubt that the milk becomes more or less impregnated with these agents. For a similar reason, powerful medicines should be avoided, and when laxatives are required, those of the simplest kinds ought to be preferred. As a summary of the whole, it may generally be stated, that if the health of the nurse become deranged from any cause, her milk will also become more or less deteriorated, and consequently its nutritious and salutary effects upon the infant proportionally diminished.

Milk of the Ass.—This milk contains more sugar than that of the cow, and less curd. The cream is in less proportion than that of woman's milk, although the latter resembles it in several particulars. According to Chevallier and Henry, it contains caseum or curd 1.82, butter 0.11, sugar of milk 6.08, salts 0.34, water 91.65 or about 8 per cent of solid parts. It is the lightest of all the alimentary kinds of milk used in this country, is easy of digestion, and little stimulating. On this account it has been recommended in consumption and diseases accompanied with hectic fever. At one period it was much

in condition best adapted for food when about five years old, and the flesh is then full-flavoured, sapid and firm, and the fat hard; but the animal is often sent to market a year or two earlier. Mutton is generally kept for a considerable time, and longer during winter than in summer, or as long as no taint in the meat is perceived, in order to soften the fibre, or render it tender. Wedder mutton is universally preferred for sapidity and tenderness, but that of the ewe is sometimes nearly as fine in quality. The flesh of some of the smaller varieties of sheep that inhabit the mountainous parts of Scotland and Wales, is more finely flavoured than that of the ordinary kinds. Almost every other part of the body of this animal is either employed as food or applied to some useful purpose. The wool is used in the manufacture of cloth, the skin in making leather, and even its blood, bones, horns, &c., are employed in several of the arts. The fat of the sheep is harder than that of the ox, and on that account is better adapted for the manufacture of candles. The milk of the sheep is sometimes made into cheese, which, when old, possesses a very strong and agreeable pungency. See articles Milk and Cheese.

THE GOAT.

Capra Hircus.—Capridæ.—The Goat Family.—The goat, though not so valuable as the sheep, is still in an economical point of view much valued. It is reared in almost every country, for its skin, fur, flesh and milk. It is a hardy animal, and well fitted for those sterile pastures which could not support other domesticated animals. In the wild state, the goat inhabits the most elevated mountains, and even the domesticated varieties invariably ascend, if they inhabit mountainous countries. It is fearless, capricious, always in motion, but not disinclined to be gregarious, or to associate with other ani-

mals. It springs with accuracy over the most difficult ground, and can ascend to the most inaccessible pinnacles. Its senses of smell and sight are very acute; but in the selection of food it is not very particular, often feeding on bitter plants, such as hemlock, euphorbia, &c. It is very destructive to young plantations, frequently depriving the trees of their bark and buds. There are several varieties, but none of them are large in stature, though their structure is robust. Their habits are vigilant, and the hunting of them is very laborious and frequently dangerous. The steinbock of the Alps, or *capra ibex*, is considered the parent of our domestic goat by some authors; while others believe it to be the paseng of Persia, or *capra ægagrus*. In some parts of Ireland and the Highlands of Scotland, goats are considered the chief possession of the inhabitants. Their milk is used as food along with oaten-bread, part of it is converted into butter and cheese, the skins are manufactured into beds; but the flesh is rarely eaten, as this is considered by the inhabitants too expensive aliment.

Uses. The flesh of the goat, even when fattened in the same way as the sheep, is rarely so good and sweet as mutton; although in tropical countries it is said to be superior. Byron states that the flesh of the goat in the island of Fernandez is equal to the best English venison. In this country it is very dense, partly from the exercise of the animal and partly from its nature. Although very nutritious, it is not frequently eaten, being less easily digested than mutton. The flesh of the kid or young goat is more tender and delicate, but has little sapidity. The milk of the goat is nutritious, digestible, and resembles that of the cow. Cheese of a peculiar and rich flavour is made from it. The long, thick, fine and glossy hair of the Natolian goat is manufactured into the cloth named *camlet*, and is the basis of Cashmere shawls. The

skin is manufactured into Turkey or Morocco leather, and that of the kid into gloves.

THE STAG, RED DEER OR HART.

Cervus Elaphus.—Cervidæ.—The Deer Family.—The hunting of deer has been a favourite amusement with the aristocracy of Britain from the most remote antiquity, and during the uncivilised ages was a constant accompaniment of war. The improved state of agriculture has in a great measure banished these animals to the more remote districts; and venison, though now equally esteemed as in former ages, is only found at the tables of the wealthy. The red deer inhabits the temperate regions of Europe, Asia and America, is an innocent and peaceable animal, yet when roused it is furious, and there is often great danger attendant upon a deer-hunt. It is distinguished by great elegance of form, the lightness of its motions, and the size and beauty of its horns, which are branched, round and recurved. It is about 3½ feet high, of a reddish-brown colour in summer, but in winter brownish-grey, has a majestic mien and is remarkably fleet, though it sometimes attains the weight of sixteen or eighteen stones. The female or hind does not possess horns, and generally produces only one calf at a birth.

Uses. The venison of the red-deer is considered inferior to that of the fallow-deer. It has arrived at perfection when the stag is four or five years old, and is reckoned finest in quality during August, but very inferior for the two succeeding months. The flesh of the hind is preferable to that of the stag; while that of the fawn or calf is tender and succulent. Venison possesses nearly the same nutritive properties as mutton, resembling it in several points, but is greatly superior in flavour and sapidity. The fibre is coarse, hard and dense, and venison

requires to be kept for a considerable time, varying with the season, before it is used. It is rather more difficult of digestion than beef or mutton, and sometimes disagrees with those who have delicate digestive organs. The antlers of the stag or hartshorn contain about 27 per cent. of gelatin, which is sometimes extracted on account of its alimentary properties, but more frequently for fining beer and other liquors.

THE FALLOW-DEER.

Cervus Dama.—Cervidæ.—The Deer Family.—The fallow-deer is found in almost every country in Europe, except cold northern regions. It is generally believed to be a native of Scotland, though this is doubted by some authors. It is rarely found wild in the forests, but is generally bred in parks. The fallow-deer of this country is a smaller animal than the stag, but those of Spain are as large. The Virginian are about the same size or a little larger, but their flesh is inferior in flavour. It is somewhat singular, that though the stag and fallow-deer resemble one another in form, dispositions, swiftness, &c., no two animals keep more distinct, or avoid one another with more animosity. The principal distinction between them is in the horns, those of the fallow-deer being flat, and branched like the palm of the hand, whereas those of the stag are round, and branched like a tree. The fallow-deer is not so strong, courageous and cunning as the stag, but is more gentle in disposition. Its colour is reddish-brown, spotted with white, and the buck or male is about three feet in height. The female or doe generally produces one or two fawns, and sometimes three at a birth.

Uses. The flesh of this animal is the most esteemed venison, being fatter and more tender than that of other species. It is in finest condition when the deer is

three or four years old, and in the month of August. The skin is made into leather, and the horns, like those of the stag, into handles for knives, &c.

THE ROE OR ROEBUCK.

Cervus Capreolus.—Cervidæ.—The Deer Family.—The roe is the smallest species of deer known in this country, being about 2¼ feet in height. It is now found only in the Highlands of Scotland; but it is very common in America, and some of the varieties are much larger than those found in Europe. The form of the roe is very elegant, it is very swift, cunning, and even more difficult to hunt successfully than the stag. Its horns are round, and in this respect it differs from the fallow-deer, while it is distinguished from the stag by its smaller size and the paucity of its antlers. The roe is seldom so fat as the fallow-deer, and is generally less esteemed, but its flesh is sufficiently tender and digestible.

THE REIN-DEER.

Cervus Tarandus.—Cervidæ.—The Deer Family.—The rein-deer is a native of the icy northern regions, and is a most useful and almost indispensable animal to the inhabitants of these countries. It is found in Lapland, Spitzbergen, Kamtschatka, Siberia and North America. It cannot live in temperate and warm countries, and all attempts to rear it in such climates have hitherto failed. The rein-deer is less in height, but stronger built than the stag, and its legs are thicker and shorter. Its horns are larger in proportion, branching over the forehead, and its pace is a trot rather than a bound like the stag's; but it can run with a sledge for fifty or sixty miles, with the fleetness of the horse, over the snow and frozen lakes. Its food is a moss called *lichen rangiferus*, which is extremely abundant in these northern countries, but it also

feeds on frogs, snakes and the mountain rat. There are two kinds; the wild and the tame, and the first being the larger are preferred as a breed. They are not, in general, broken in for the sledge till about four years of age, and they continue in good condition for four or five years longer. The age of the rein-deer is about fifteen or sixteen years, but it is generally killed when beginning to grow old, for the sake of its skin and flesh.

Uses. During summer few of these animals are slaughtered, as the inhabitants use the excellent milk furnished by them, along with fish and fowls. Cheese of good quality is made from the milk of the rein-deer; but rarely butter, as it contains little of this ingredient. The skin is used in the manufacture of shoes, clothes, beds, &c., the horns are made into glue, the tendons are dried and divided, so as to make a strong species of sewing thread. When the rein-deer is fat and in good condition, as it is generally during the month of August, its flesh is said to be equal to the best English venison. The tongue is considered a great delicacy, and is sometimes exported into more southern countries.

THE HARE.—MAUKIN, *Scotland.*

Lepus Timidus.—Leporidæ.—The Hare Family.—There is scarcely a country, from the torrid zone to the poles, where the hare is not found in some of its varieties. In the neighbourhood of the North Pole it becomes white during winter, and congregates into troops of several hundreds. The hares are caught in traps, and the skins are collected on account of the fur, which is used in the manufacture of hats. Those of Italy, Spain and Barbary are smaller than those in Britain, and the variety peculiar to the Milanese country is esteemed the best in Europe. The hare was considered by the ancient Britons an unclean animal, and this notion is still held by the modern

Jews and Mahometans; but by every other people, whether barbarians or refined, the flesh of this animal is esteemed. It is a remarkably timid creature, and nature seems to have given it no other means of defence against its numerous foes but swiftness. All its senses seem calculated to promote its flight. The eyes are large, and placed backwards on the head; the ears are also large and moveable, so that it can collect sound from every quarter; the muscles are strong without fat, and the hinder are longer than the fore legs. The hare lives chiefly upon grass, roots, leaves, fruit, corn, and upon the bark of trees during winter, thus frequently doing great injury to young plantations and gardens. When tamed, it is fed on garden herbs; but the flesh of those that are thus reared is inferior in flavour. The hare is generally about eight or nine pounds in weight.

Uses. The flesh of this animal is generally dark-coloured, but in Peru, the Cape of Good Hope, and at the North Pole, it is whitish. It is dense, dry, and devoid of succulency; but when moderately tender is not very difficult of digestion, as it contains very little fatty matter. It is often used along with the blood in the formation of soup, which has a very agreeable and savoury flavour. When the flesh of the hare is intended to be eaten, a young animal ought to be preferred, and it should be kept for several days or until the fibre becomes tender.

THE RABBIT.

Lepus Cuniculus.—Leporidæ.—The Hare Family.—The rabbit resembles the hare in form and disposition, but they refuse to mix together, which shows them to be distinct species. It is equally inoffensive as the hare and has as many enemies, but it secretes itself in holes which cannot be entered by the fox, hound, kite, &c.,

and it is remarkably prolific, so that its extirpation is scarcely possible. Rabbits are common in almost every country, but are supposed to be natives of a warm climate. They live longer than the hare, and are generally fatter, from their having less exercise and a smaller amount of molestation. The rabbit is capable of being easily domesticated, and in this state it becomes larger and fatter; but its flesh has less flavour than that of the wild variety. It is, like the hare, very swift, and as it generally has not far to run to its warren, few dogs can overtake it. Its food consists of the young shoots of corn, tops of furze, bark of young trees, &c., and in the tame state cabbage or other green vegetables. The fur of the wild rabbit has generally a greyish-brown colour, the neck reddish, throat and belly whitish; but the domestic varieties are white, brown, black and mouse-coloured.

Uses. The tame rabbit is considered of finest quality for the table when three months old; but if well fed, will be found good a year after this period. The wild rabbit can only be had in good condition at particular seasons. The flesh is white, tender, succulent, very unlike that of the hare, but has some resemblance to that of a young fowl. It appears to contain less fibrin and more gelatine than that of the hare; and is extremely light and easily digested. It is well adapted for invalids, convalescents, and those who have delicate digestive organs. The soup procured from it is agreeable, but is greatly inferior in flavour to that made from the hare. The rabbit is valued also for its skin, which is used for lining clothes, as a cheap substitute for ermine. The fur of the skin is chiefly employed in the manufacture of hats, being mixed with that of the beaver.

THE HOG.

Sus Scrofa.—*Suidæ.*—THE HOG FAMILY.—The hog, during former ages, was very abundant in Britain; and the hunting of the wild boar was a favourite though dangerous amusement among the aristocracy. In its wild state this animal seldom varies in colour, being generally of a dark grey, and smaller than most of the domestic breeds. It is remarkably fierce and dangerous when attacked; but it does not attack other animals, nor seem to avoid them. The flesh of the wild boar is a favourite dish with all nations, whether barbarous or civilised. The Romans held it in high estimation, and frequently a whole animal was served up at a time, along with honey and boiled wine as a sauce. The tame hog is found in every country, except the polar regions; and there are numerous varieties of this animal, which are chiefly distinguished by thickness of fur or length of leg. The food of the wild hog consists chiefly of roots and vegetables, and it rarely attacks any other animal; but if it finds one dying or dead, however putrid the latter may be, it immediately devours it. In the domestic state the hog is much more filthy in its habits and mode of eating than the wild animal, and in point of appetite is almost insatiable. When supplied with a sufficient quantity of food, it may be fattened very rapidly, and sometimes attains such an enormous size, that its legs cannot support it for any length of time. It is remarkable for fecundity, and on this account, as well as the cheap nature of its food and the qualities of its flesh, it is one of the most useful animals employed for the sustenance of man. In hot climates, such as Egypt, Syria, &c., the flesh of the domestic hog is generally considered unwholesome, on account of its softness and superabundance of fat; although it is very white

and delicate. The use of it is therefore generally proscribed in these countries, particularly among the Jews, Mahometans and Copts. The flesh of the China and Siam hog is, however, considered excellent, and superior to English pork. The introduction of the small Chinese hog into this country has much improved the breed of this animal, and the delicacy of the flesh. The baby-roussa, or Indian hog, is in high estimation throughout Hindostan for the excellence of its flesh. The qualities of hog's flesh are much influenced by the nature of the food it receives, particularly for some time before it is sent to market. When fed on soft foul vegetables, the fat is always soft and disagreeable; but if a portion of farinaceous matter, such as beans, peas, meal, milk, &c., be employed, the fatty matter is hardened, and the quality and flavour of the flesh improved. It is a common practice in some parts of England, to drive the hogs into the forests at the proper season, that they may feed on acorns and other farinaceous nuts that fall from the trees; and it is stated that Westphalia hams owe much of their excellence to a similar practice.

Uses. Pork was considered by the ancients as the most nutritive of all aliments, and on that account was employed in the diet of the *athletæ*. It abounds more in fatty matter than any other kind of animal food, and is therefore very nutritious when thoroughly digested; but strong assimilating powers are required to effect this. It is by no means well adapted for those who have delicate digestive organs, being liable to produce nausea, putrid eructations, &c. It is rendered more digestible when slightly salted, the salt seeming to correct its tendency to putrescency. Of all kinds of animal food, it is the best adapted for this process, for little salt is required. It rarely acquires an over-degree of saltness, and generally remains succulent, sapid, and more tender

than beef or mutton. The flesh of the young pig is considered more digestible and less stimulant than that of the full-grown animal. Like that of other young animals, it abounds in gelatinous matter, and its fat is less strong and oily.

VARIOUS ORGANS OF MAMMIFEROUS ANIMALS.

LIGAMENT, CARTILAGE, TENDON, &c.—are composed chiefly of albumen and gelatin; and, from the hardness of their texture, are very difficult of digestion, if not thoroughly softened by long boiling. Animal flesh generally contains a small proportion of these parts; and though they assist materially in the formation of soups, are little esteemed either as nutritive or digestible substances.

THE SKIN.—This organ is rarely used, with the exception of that portion covering the heads of sheep, lambs, &c. which is eaten along with the muscular parts attached to the bones. The skin consists principally of gelatin; and although not very nutritive, is very light and digestible when procured from young animals, and very thoroughly boiled. The broth made from the head of a sheep is a popular prescription for diarrhœa, being soothing and gelatinous in its qualities. This soup is a favourite with many persons in Scotland, and is quite wholesome; although it possesses a peculiar flavour derived from the singeing of the wool.

"COW-HEELS"—contain a large quantity of gelatin, form a very insipid, and not very nutritive, kind of aliment; but are very light and digestible when sufficiently tender.

BONES—contain a large proportion of gelatin. According to M. D'Arcet, 100 parts of bones contain 30 of gelatin, 10 of fat, and 60 of earthy matter. Flat and

cylindrical bones do not contain much fat, and are generally used by button-makers, with the exception of their heads, which sometimes contain a much larger proportion than is here mentioned. In some of the hospitals on the Continent of Europe, soup is made from bones on the large scale, by extracting the gelatin. This is done, either by the aid of steam or by dissolving the phosphate of lime or earthy matter in muriatic acid; which latter method is the best, inasmuch as the soup formed has a superior flavour. The bones are previously reduced to small fragments; but M. D'Arcet recommends them to be crushed without redoubled strokes, so as to prevent the generation of any empyreumatic or disagreeable flavour. They ought to be converted into soup soon after this is effected, or preserved in water saturated with common salt. Although gelatin is of itself not very nutritive, yet when combined with a portion of beef or mutton, along with peas, barley or rice, a very excellent soup may be made from it. In an economical point of view, the employment of bones, according to this or a similar method, is worthy the attention of the directors of hospitals and other institutions for the poor.

FAT.—Fat and cellular tissue form about one-seventh of the weight of ordinary meat. It is very nutritive, and tends greatly, in healthy individuals, to produce corpulency; but is very difficult of digestion. It is rarely eaten alone, but frequently in combination with other alimentary matters.

MARROW—is almost a pure fatty matter; but has a more agreeable flavour, and is rather more easily digested than the ordinary fat of meat.

THE STOMACH, &c.—of the ox is used in many parts of Scotland, under the name of "*tripe*," as a favourite dish. The stomachs of ruminant animals contain gelatin, albumen, muscular fibre, and are allied, in their nutritive and

digestible properties, to ordinary meat. When tender, and boiled with milk, this dish is very agreeable, light, and digestible. Soup made of this article is a popular remedy for diarrhœa and dysentery.

THE KIDNEY—is composed of a congeries of vessels and parenchymatous or cellular tissue; but it contains no muscular fibres. Its texture is sometimes a little hard; but it is nutritive and moderately digestible. Kidneys form an excellent soup; but they are also cooked by broiling, &c. Those of the lamb, calf, &c., are very tender, agreeable and digestible.

THE PANCREAS OR SWEETBREAD.—This is a glandular organ of tender texture. It is a very agreeable, light, moderately nutritive, and digestible substance.

THE LIVER—is composed of vessels and parenchymatous or cellular texture, and is somewhat friable. Its flavour is tolerably agreeable; and it is moderately nutritive and digestible. In some fishes, and fowls that have been over-fed, it contains or becomes impregnated with a large quantity of oil or fat, and is thus very difficult of digestion. When used as aliment, those of young animals ought to be preferred.

THE HEART—is a muscular organ, and is therefore allied to ordinary meat in nutritive and digestible properties. That of the adult animal, particularly when old, is hard in texture and not easily dissolved in the stomach; but the heart of the calf or young ox is moderately tender and digestible.

THE TONGUE—is a soft fleshy organ, tender, digestible, nutritive, and of agreeable flavour. The root is generally more tough and less savoury than the anterior portions. A moderate degree of salting improves its flavour.

THE BLOOD—contains fibrin, albumen, and fatty matter as alimentary principles. Its taste is saline but not agreeable, and alkaline from the soda it contains. Ac-

cording to Liebig, it contains 20 per cent. of dry residue after its water has been evaporated. It must therefore be considered very nutritive, although by no means a favourite dish in this country. It is moderately digestible; and is made into puddings with oatmeal by the peasantry of Scotland. The blood of the hare is said to communicate to the soup formed from the animal a portion of its peculiar flavour. Blood is employed for clarifying some liquids, and in several of the arts.

BIRDS.

THE COMMON FOWL.

Gallus Domesticus.—*Gallinadæ.*—THE POULTRY FAMILY.—The common fowl has long been domesticated in Europe, but it has not been ascertained at what period this occurred. It is stated by Dr. Fleming that it was probably introduced into this kingdom by the Phœnicians, while trading with the ancient inhabitants in tin. The cock was probably the earliest companion of man, and the ancients, like the moderns in almost every country, were addicted to the degrading practice of cock-fighting. It is said to be found wild in some of the islands of the Indian ocean; the plumage being black and yellow, and the bones of a blackish colour. There are numerous varieties of this bird, characterised by size, a different kind of plumage, &c. The game-cock and the dunghill-cock are two very distinguished varieties; the first being remarkable for its courage in fighting with its own species, and for its sterility, and the latter for cowardice and fecundity. The age of the cock is supposed to be about ten years; but this point has not been accurately ascertained.

The food of this fowl consists of farinaceous seeds and other substances of a similar kind, and if allowed abundance of this kind of aliment, it generally becomes sufficiently fat, without being subjected to the unnatural process of *cramming* during confinement in small coops. The common fowl is extensively reared in all countries, and is the only instance where artificial means have been successfully attempted for this purpose. In Egypt forty or fifty thousand chickens are hatched at once in buildings heated by flues. This method has not succeeded so well in Europe.

Uses. The flesh of the domestic fowl is white, tender when young, not in general overloaded with fat, very digestible, not quite so nutritive, but less stimulating than beef or mutton. The flesh of chickens is gelatinous, like that of other young animals, and is in general very easily digested. It is well adapted for delicate individuals and convalescents, and forms light, nutritive and agreeable soups. The flesh of the cock and old fowls is very tough and indigestible.

EGGS.

The egg of the domestic fowl has the following composition. 1. A hard external envelope or shell, consisting chiefly of carbonate of lime. 2. A thin membrane which lines the interior wall of the calcareous shell. 3. A white glairy transparent liquid enclosed in membranous cells, and composed of albumen about 15 per cent., water 80, mucus 4.5, and saline matter. 4. The yolk or yelk, a thick yellow fluid, which consists of about 54 per cent. of water, 17 of albumen containing phosphorus, 29 of oil containing a crystallisable fatty principle, and a colouring matter. By keeping, eggs become lighter, in consequence of the evaporation of their contained water. The relative weights of the different constituents of an egg,

in 1000 parts, are the following: shell and membrane 106.9, albumen or glaire 604.2, yolk 288.9. By boiling, an egg loses from two to three per cent. of its weight. Eggs are liable to putrefaction, when long kept during hot weather, and various methods are practised for preventing this occurrence. These act chiefly on the principle of excluding the air, for the shell is very porous in texture. The application of butter or any fatty substance to the shell is a well known and generally an effectual method. Eggs are also preserved in a thin mixture of lime and water, and by dipping them in boiling water, which appears to act by coagulating a small portion of the albumen next the shell, and thus excluding the air. They are also packed in salt as a means of preservation.

They should not be placed near any odoriferous substance, as they are liable to be tainted by the effluvia issuing from it. It is said that musty straw will give them a disagreeable flavour.

Uses. Eggs form a light and nutritive aliment when properly cooked; but if long boiled, or otherwise exposed to much heat, they become very indigestible. This is chiefly owing to the consolidation or hardness of texture they acquire; for they are thus rendered difficult of reduction in the stomach. Eggs should therefore be exposed to heat no longer than is necessary to give them the consistence of honey. In this state they may be taken by children, convalescents, and even by dyspeptics, although there are some individuals, of weak digestive organs, who cannot eat eggs in any form with impunity. The egg of the common fowl is generally preferred to that of the goose or duck, which has a stronger, but not such an agreeable flavour. The egg of the turkey is rich and agreeable, and that of the guinea-hen, although small, has a very delicate flavour. The eggs of the wood-cock, lapwing, plover, are much esteemed by many

persons. Those of sea-fowls have generally a strong fishy flavour. The white of egg beat up with water is an important remedy for poisoning with corrosive sublimate and sulphate of copper. It is employed to clarify wines, spirituous liqueurs, coffee, &c., and is used by bookbinders as a varnish. It enters into the composition of an immense number of culinary and confectionary preparations; but those articles which contain a large quantity of eggs are in general more or less difficult of digestion.

THE PHEASANT.

Phasianus Colchicus. — *Gallinadæ.* — THE POULTRY FAMILY.—The pheasant was first brought into Greece from the banks of the Phasis, a river of Colchis (Mingrelia) in Asia Minor. It is now abundant all over Europe. The period is not exactly known when this bird was introduced into Britain; but it is mentioned in Echard's history of England as worth only four pence, in the year 1299. The breed is preserved in this country by the rearing of great numbers in confinement, and then turning them into the woods of the nobility and gentry. It is, next to the peacock, the most beautiful domesticated bird of this country; and its splendid plumage and form are pretty well known. There are two well marked varieties, namely, the common pheasant, which is the most ancient, and the ringed pheasant more lately introduced into Britain. The favourite food of this bird is the tender shoots of the potato, and insects with their larvæ, wild fruits, berries, the various grains, roots, turnips, &c. The pheasant thrives better in a wild state than when domesticated, and is more prolific. It is more attached to its native freedom in the woods than the common fowl, and frequents moist ground covered with rushes, brambles or bushes. It hatches its eggs about

the beginning of June, which are from 10 to 14 in number, nearly 2 inches long and of an olive-brown colour.

The beak of the pheasant is of a whitish horn colour; eyes hazel, * surrounded with red naked skin; head and neck blue, with brown, green and purple reflections; back orange; wing-coverts reddish; tail-feathers very long, yellowish-brown, with transverse black bars; breast and belly golden red; legs, spurs, toes and claws of a brownish lead colour; length about 3 feet; female measures about 2 feet; weight about 2½ pounds; but occasionally pheasants have been found to weigh 4½ pounds.

Uses. The pheasant has always been considered greatly superior in flavour to the domestic fowl, to which, in many respects, it is much allied in dietetic qualities. The flesh of the pheasant in a wild state is however still more highly flavoured than that of the domesticated bird. It is white and tender, but it requires to be kept for six or seven days, else its fine flavour is not sufficiently developed. The young bird, like the chicken, is very tender, gelatinous and easily digested.

THE TURKEY.

Meleagris Galopavo.—Gallinadæ.—The Poultry Family.—The turkey is a native of North America; but the exact period of its introduction into Europe and Britain is unknown. It is considered probable, by some authors, that it was brought from Mexico by the Spaniards about the year 1530. This bird is now domesticated in almost every civilised country, and is very abundant; although it is rapidly decreasing in its native wilds. The wild turkey is rather a handsome bird, with lively plumage, and grows to a much larger size than the domesticated variety, averaging from 15 to 18 pounds in weight; but they

* The colour of the iris.

have been found more than double the usual size. They associate in flocks of several hundreds, and feed upon maize, berries, fruits, grasses, beetles, tadpoles, frogs, lizards, &c. They fatten most rapidly on acorns, and it is stated that they grow to such a size in March that they cannot fly beyond a few hundred yards, and are soon run down by a horseman. The domestic turkey is a stupid, cowardly, pompous and quarrelsome bird; and his ire is greatly excited by anything of a red colour. It is considered the largest of our poultry; but the young birds are very difficult to rear, and require very great attention. When grown up, they become hardy and are fed at a comparatively small expense. Multitudes of them are reared in Norfolk and Suffolk, for the London market. The head and upper part of the turkey's neck are covered with a papillated skin; there are appendages under the throat and on the forehead; the coverts of the tail are capable of erection; and the males are furnished with spurs on the tarsi, and a tuft of hairs on the neck.

Uses. The flesh of the wild is considered greatly superior to that of the domesticated turkey in flavour; but the latter is also much esteemed, being white, tender, delicate, nutritious and easily digested. The young bird is the most tender, and best adapted for invalids and those who have delicate digestive organs. Its nutritive and digestible qualities are very similar to those of the common fowl, being rather more rich and superior in flavour. The egg of the turkey is large and spotted, having a rich and agreeable flavour.

THE PEACOCK.

Pavo Cristatus.—Gallinadæ.—The Poultry Family. —The peacock is a native of Asia, and is found wild in India, in which country the shooting of this bird is a favourite amusement. It is found in great abundance

in the jungles; and Colonel Williamson states that whole woods are sometimes covered with their plumage, and that a rising sun gives this spectacle a most splendid brilliancy. It was known to the ancients and is mentioned by Solomon. It was probably first introduced into Europe on account of its beauty; and this quality would naturally lead mankind to try its dietetic properties. The Romans considered it one of the greatest ornaments of a feast; and during the early periods of English history, few noble feasts were considered complete without the presence of this bird. It was stuffed with spices and sweet herbs, roasted and afterwards covered with its skin and feathers. The food of the peacock is the farinaceous grains; but barley is said to be its favourite aliment. It is, however, very capricious in this respect, for when it has plenty of other kinds of food, it will devour insects, tender plants, &c.; so that it is a great annoyance to the gardener.

Its age is said to be about twenty years; but it is not furnished with the beautiful and variegated plumage of the tail until its third year. The young birds and the eggs are often presented at the tables of the opulent, but peacocks are principally reared as ornaments to a park or lawn.

Uses. The flesh of this bird resembles that of the pheasant in flavour; but is reckoned inferior to other domestic poultry. It is supposed to be in prime condition when about the age of three years; but when old is dry and insipid. The young hen is generally preferred. In the native country of the peacock, superb dresses are made from its skin and feathers, adorned with precious stones.

THE GUINEA-HEN.

Numidia Meleagris. — *Gallinadæ.* — THE POULTRY FAMILY.—This fowl is a native of Africa, and is found abundant on the Guinea coast. It lives in flocks, which sometimes amount to hundreds. It flies with a powerful flight, and its cry is frequent, grating and disagreeable. It is reared in this country in the poultry-yard; but as it is very quarrelsome and strong, it is not often found in the domesticated state. Its general habits are those of the poultry family. The male and female resemble one another very much in external appearance; and it has a dark grey colour, which is beautifully variegated with white spots.

USES. The flesh of this bird, when young, is white, tender, of a very agreeable flavour, and similar in many respects to that of the common fowl. Its eggs, which are speckled, have a delicate flavour.

THE COMMON PARTRIDGE.

Perdix Cinerea.—*Tetraonidæ.*—THE GROUSE FAMILY.—The partridge is found in all Europe, is abundant in Britain, and most common in cultivated districts. This bird is migratory, and frequents Barbary and Egypt. It is remarkable for attachment to its eggs and young; and not only uses stratagems to decoy the enemy, but will even, though naturally timid, sometimes vigorously defend them against the attacks of carnivorous birds. The young partridges leave their nests in about twelve hours after being hatched, and are conducted by their parents to ant-hills, the eggs in which constitute their early food. When full-grown they feed on all kinds of grain and young plants. A dry summer is favourable to the breeding of partridges. The eggs are generally deposited among long grass, fields of corn or clover, and

have an olive-brown colour, are nearly 1½ inches in length, and from 12 to 20 are produced by one female. The beak of the male partridge is bluish-white; eyes hazel; behind the eye there is a small patch of red warty skin; a bay-coloured mark like a horse-shoe is found on the breast; tail brown; legs and toes bluish-white; claws brown; face and throat reddish-brown; wing rounded in form, and its three first feathers are shorter than the fourth; length about 12 or 13 inches; weight 15 ounces. The general plumage is a mixed cinereous brown and black; but there are many varieties of colour in the partridge.

Uses. Old partridges are tough and very inferior to young birds, which generally have yellowish-coloured legs and dark bills. The flesh of the partridge, when kept a sufficient length of time, is very sapid, agreeable, moderately tender and digestible. Mr. Dolby states that there are fifty different methods of dressing this bird for the table. Though the best of the grouse family, it is not quite so well adapted for invalids and convalescents as the common fowl, being more stimulating. The largest birds are found in arable districts where grain abounds. Those met in the neighbourhood of moors are much smaller; their flesh being darker in colour, superior in flavour, and resembling that of the grouse.

The Red-legged or Guernsey Partridge.—*Perdix Rufa*—is found in the south of England; but is met more frequently in Jersey, Guernsey, France, Spain, Italy, &c. Its bill and legs are red, throat and cheeks white, margined with black. It is much more difficult to procure a shot at this bird than the common partridge, being very wild. The flesh of this species is white, more dry, and less esteemed than that of the common partridge.

THE COMMON QUAIL.

Coturnix Vulgaris. — *Tetraonidæ.* — THE GROUSE FAMILY.—This bird resembles the partridge in shape and some other qualities, but is much smaller. It is now only an occasional visitor of Great Britain, arriving from Africa, Asia Minor, &c. about the beginning of May, and departing in October. It is very abundant in the south of Europe, and many thousands are imported alive from France, to be fattened on hemp-seed by the London poulterers. Quails are taken by nets, into which they are decoyed by imitating their call. On the coast of Italy and Sicily they arrive, at certain seasons, in immense numbers, forming perfect clouds. In the island of Capri, in the gulf of Naples, they formed the principal revenue of the bishop of that place; and it is stated that from twelve to sixty thousand were annually taken. They are very pugnacious, and quail-fighting was common among the Athenians; but their flesh was considered unwholesome, because they were supposed to feed on hellebore. This bird is generally believed to be the same species that was sent to the famishing Israelites in the wilderness. Quails feed on leaves, grain, insects, &c.; and they are occasionally found in wheat stubbles by partridge-shooters. The eggs are 8 or 10 in number, of a yellowish-white colour, speckled with brown. The beak of the quail is brownish-grey; eyes hazel; plumage black, brown, and ash-coloured; tail of 12 feathers, dusky, tipt with white; chin and throat white, bounded by two half-circular dark-brown bands.

USES. When fat, the flesh of this bird is, by many persons, considered a great delicacy, and nearly equal to that of the landrail. Its flavour is inferior to that of the partridge, although these two birds are much allied in dietetic properties. Mr. Yarrell states that their con-

sumption in London is large from May to August, and he considers them heating food.

THE RED GROUSE.

Lagopus Scoticus.—Tetraonidæ.—The Grouse Family.—This bird is a native of Britain, is peculiar to that kingdom, and is found in wild extensive moors and heaths. It is not so common in the more southern districts as formerly, from an over-persecution, according to some writers. When little disturbed, it is not very wild; but if much followed, it becomes very wary, and can only be approached by stratagem. It feeds on berries, heath-tops, and corn; and is easily domesticated. Grouse pair early in spring; and the nest is formed of ling and grass, on the ground, under the shelter of a heather bush. The eggs are from 8 to 15 in number, of a reddish-white colour, with numerous brown blotches; length about $1\frac{3}{4}$ inches. The beak is black; eyes hazel; a crescentic spot of red skin over the eye; head and neck reddish-brown; back, wings and tail-coverts chestnut-brown, barred and speckled with black; plumage of breast almost black, and tipt with white; legs and toes covered with short greyish-white feathers; length about 16 inches; weight from 20 to 24 ounces; female smaller than male.

Uses. The flesh of the red grouse, when recently killed, is tough and not readily digested. It is therefore generally kept for a considerable time, even until signs of decomposition begin to appear. It is then sufficiently tender, very sapid and agreeable in flavour. It is generally more esteemed than any other species of grouse; but none of this family are so well adapted for those who have delicate digestive organs as birds of the poultry kind.

THE PTARMIGAN.

Lagopus Vulgaris. — *Tetraonidæ.* — THE GROUSE FAMILY.—This bird is a native of Europe and America, but is confined to the most alpine districts. It is now very scarce, and the range of the Grampians is considered its most southern British station. It inhabits the most barren and rocky spots, which are very difficult of access. It is nearly of the same size as the red grouse, and is reckoned a stupid bird. Its weight is about 19 ounces. During summer, its plumage is cinereous, tinged with brown, with black and dusky spots and bars. In winter it is nearly white.

USES. The flesh of this bird possesses dietetic properties similar to those of the red grouse. Immense quantities of ptarmigan are caught in Norway and Lapland by snares made of horse-hair. They are kept in a frozen state, and shipped for the various ports of England.

THE BLACK-COCK.—BLACK GROUSE.

Tetrao Tetrix.—*Tetraonidæ.*—THE GROUSE FAMILY.—This bird is pretty generally spread over Europe, and is very common in the wild and wooded districts of Britain, particularly in Scotland. During summer, it feeds on the seeds of the various grasses and the berries of the different alpine plants. In winter, the tender shoots of the fir, catkins of birch and hazel, and the gleanings of the stubble field furnish it with nourishment. Its eggs are from 6 to 8 in number, yellowish-white, with orange-brown spots, and about 2 inches in length. The beak is black; eyes dark brown; a semilunar patch of red skin over the eye; head, neck, back, wing-coverts, rump and tail black; chin, neck, breast, belly and flanks black; under wing-coverts, and under tail-coverts white; toes and claws blackish-brown. Length 22 inches;

weight about 48 ounces. The female or grey hen is smaller, of a brown colour, mottled with black, and the tail feathers are not curved outwards like those of the male.

Uses. The black-cock has the same sapid and high-flavoured properties as the red grouse, and requires to be kept the same length of time before it is sufficiently tender for dietetic use. Large quantities are imported into London from Norway and Sweden.

THE CAPERCAILLIE.

Tetrao Urogallus.—Tetraonidæ.—The Grouse Family.—This bird, which has been called the "giant grouse," is common in the forests of Norway, though now extinct in Britain. It is about 2 feet 7 or 8 inches in length, and weighs 12 or 13 pounds. Recent attempts have been made to recruit our forests from Norway with this beautiful bird; and successfully in one or more districts.

THE RING PIGEON.—WOOD PIGEON, *Cushat.*

Columba Palumbus.—Columbidæ.—The Pigeon Family.—This bird is found throughout the greater part of Europe, is abundant, and a permanent resident in Britain. It has not been found in America, nor within the tropics of the old world. It congregates together in immense flocks, towards the end of October, which remain thus united till the beginning of February, when they separate into pairs. They feed, during winter, upon the produce of the stubble field, acorns, turnips, greens, &c., and in spring and summer on clover, wheat, &c. This pigeon has not been domesticated, although this has repeatedly been attempted. It is remarkable for its gentleness, fidelity, and attachment, and has in all ages been a bird sacred to peace. The amatory notes of wood pigeons are heard

in the woods during March and April, and consist of a musical coo or murmur. The nest of this dove is generally built in a fir-tree, and consists of a few sticks placed transversely. Its eggs are two, white, oval and nearly 1¾ inches long. The beak is reddish orange; eyes pale yellow; head and upper part of neck bluish-grey, the feathers on the sides of the neck tipped with white, forming parts of several oblique rings; neck and breast purplish-red; general plumage bluish gray; legs and toes red; claws brown; length 17 inches; weight about 20 ounces; being the largest wild pigeon in this country. The female resembles the male, but is rather smaller.

Uses. The flesh of the ring pigeon is of good flavour and quality, and that of the old bird is said to resemble moorfowl. When it feeds on the turnip, the flesh becomes imbued with the flavour of this root, so as to render it disagreeable.

THE ROCK DOVE.—COMMON PIGEON.

Columba Livia.—Columbidæ.—The Pigeon Family.—This bird is the original stock of our common pigeon. It inhabits rocky and precipitous cliffs and caverns on the sea-coast. It is found in the rocky islands of Africa, Asia and the Mediterranean, and on the rocky coasts of Britain, &c. It is, however, much better known in its domesticated state in the dovecot. The domesticated varieties are exceedingly numerous, not only in colours, but also in the shape of the feathers and form of the beak. These, it is said, may all be traced to the rock-dove. This bird feeds chiefly on the various kinds of grain. It possesses great powers of vision, flies with great rapidity, and lives for a considerable time, even to the extent of twenty years. The *carrier pigeon* is a very interesting variety. It is trained, when fully fledged, by being kept in the dark and without food for

eight hours; and then carried in a bag or basket to the distance of about half a mile from home and let loose. Its flight is at first spiral, until it attains a sufficient elevation for correct observation. It then flies in a direct course, at the rate of thirty or forty miles an hour. One hundred miles an hour have been recorded as the transit of particular *carriers*.

Uses. The flesh of the young bird is tender, light and easily digested; but that of the old pigeon is tough, dry and insipid. The domesticated pigeon is reckoned superior to the wild bird, the flesh of the latter being dark-coloured. It is in high season from June to November. The young domestic pigeon does not differ materially, in dietetic properties, from the chicken, but is generally considered more stimulating.

THE ROOK.

Corvus Frugilegus.—Corvidæ.—The Crow Family.—Rooks differ from other crows by living in flocks; and they are fond of establishing their rookeries near human habitations. They feed upon grubs, worms, grain, &c. In the beginning of March, rooks begin to repair their nests; but new nests are built by the young birds of the previous year. Mr. Yarrell states that when a pair of rooks attempt to build a nest in a tree that was previously unoccupied by one, and at a distance from the main body, it is invariably destroyed by the others. When a body of rooks are feeding, one or two sentinels are always placed to give the alarm of danger. The eggs of the rook are 4 or 5 in number, pale-green, with greenish-brown blotches. During the period of incubation, the male feeds the female, and occasionally supplies her place. The bill of the rook is nearly straight, and the skin at the base is naked and scurfy.

Uses. The flesh of the old rook is tough, indigestible,

and rarely used as aliment. That of the young rook, when properly cooked, is pretty agreeable and digestible. It is said to resemble the young pigeon in some of its qualities. A rook pie is a favourite dish in some parts of Scotland. The skin and back-bone of the bird ought to be removed before it is cooked, otherwise the taste will be bitter or disagreeable.

THE GOLDEN PLOVER.—YELLOW OR GREEN PLOVER.

Charadrius Pluvialis.—Charadriidæ.—The Plover Family.—This species is generally found on the swampy grounds and heaths of Scotland, north of England, &c., during summer, and about the sea-shore in winter. The breeding season occurs during summer; and the nest, which is made with rushes, generally contains 4 eggs, large in proportion to the size of the bird. They have an olivaceous-yellow colour, with brownish-black spots, and their length is about 2 inches. Plovers feed on worms, slugs, insects, &c. Their call is a shrill whistle; and they may be decoyed within shot by a good imitation of it. They congregate together, forming flocks, during autumn, migrate to the southern counties, and have great powers of flight. The length of this bird is about 11 inches, weight 9 ounces. Bill dusky; eyes hazel; legs dusky; plumage black above, with yellowish-green spots; under surface of body jet black, with a white band on the sides below the wing. During winter the plumage changes, and the black on the breast disappears.

Uses.' This is considered an excellent bird for the table. The flavour of its flesh is peculiar, agreeable to many individuals, and, when fat, most esteemed. When kept until it becomes tender, it is pretty digestible. Plover eggs are considered a delicacy by some persons.

THE GREY PLOVER.—THE GREY SAND-PIPER.

Squatarola Cinerea. — *Charadriidæ.* — THE PLOVER FAMILY.—This bird resembles the golden plover in many particulars, namely, in habits, appearance, and in the periodical change of the plumage. It retires, however, to northern countries during summer or breeding season; and it possesses a hind toe, which the golden plover wants. The eggs are greenish, with brown spots. Forehead and top of the head white; tail-feathers white, with numerous greyish-black, transverse bars; bill, legs and eyes, black; length 12 inches; weight about 7 ounces.

USES. This species possesses properties, as aliment, similar to those of the golden plover; and is, by some persons, considered a superior game bird.

THE LAPWING.—PEEWIT OR PEESWEEP.

Vanellus Cristatus.—*Charadriidæ.*—THE PLOVER FAMILY.—This is a very common bird in Britain, Ireland, and on the Continent of Europe. It is found in the vicinity of marches, lakes, rivers, wild heaths, &c. It feeds on worms, slugs, insects, &c. It is sometimes tamed, and turned into gardens to destroy worms. It is reckoned an unlucky bird in Scotland, and this probably has arisen from its peculiar flight and violent screaming. When any person approaches the nests of these birds, the males fly round the intruder and utter very clamorous notes. The name *lapwing* is derived from the flapping of its wings; and *peewit* from the note of this bird. They collect in flocks during autumn, and frequent the sea shore, marshes, &c. The nest consists of a few rushes, placed in a slight depression in the ground, and generally contains 4 eggs, of an olive colour, with blackish-

brown spots. Beak black; eyes hazel; head black, with a tuft behind of white slender feathers; breast black, irridescent; back green, irridescent; sides of the neck and belly white; tail white, the end black; legs and toes orange-brown; claws black; length 12 or 13 inches; weight 8 ounces.

Uses. The flesh of this bird is much esteemed for its agreeable, digestible and nutritious qualities. It is in best season from autumn to the end of winter. Its eggs, like those of the plover family, have a very agreeable flavour, and sell at a high price. Immense quantities of them are collected in some of the marshes of England, for the London market. The egg of a lapwing weighs nearly an ounce.

THE COMMON CURLEW.—THE WHAUP, *Scot.*

Numenius Arquata.—Scolopacidæ.—The Curlew and Sandpiper Family.—The curlew is a very common bird on the British coast during autumn and winter. It retires in spring to northern latitudes, for the purpose of breeding. The young are capable of being tamed. It is believed to be an unlucky bird in Scotland, and is alluded to as such by Sir Walter Scott. Its long beak has probably fostered this belief, as well as its appearance in wild sequestered situations. Curlews frequent the sea shore in flocks, flying in a direct line, and frequently in the form of a wedge. They feed on marine insects, worms, &c. They are very cautious birds, and very difficult to approach; but may be deceived by imitating their cry, which sounds like *corlieu*, and hence the name. The nest consists of a few leaves placed together among rushes or long grass. The eggs are 5 in number, about 2¼ inches in length, pear-shaped, of an olive-green colour, with dark green and brown spots. The beak is dark brown, six or seven inches long, curved; eyes dark brown; head and neck

pale brown; breast, belly and rump white, with oblong dusky spots and bars; tail of twelve feathers grey, with brown bands; legs, which are long, and toes, pale blue; length about 24 inches; weight 37 ounces. The plumage of the male and female is similar; but the latter is the largest in size.

USES. The flesh of this bird is generally not much esteemed in this country, being often somewhat dark coloured and fishy in flavour. In Labrador, where curlews are said to be numerous, their flesh is considered excellent.

THE WHIMBREL CURLEW—is smaller in size, not so numerous, but similar in most particulars to the common curlew.

THE COMMON SNIPE.

Scolopax Gallinago.—Scolopacidæ.—THE CURLEW AND SANDPIPER FAMILY.—This bird is very common in Britain, and breeds in many of the counties of England, Scotland and Ireland. It is generally believed to be migratory in its habits, the greatest flights coming from Norway and other northern parts of Europe at the beginning of winter. Snipes seldom remain long in one place. During the breeding season, the note of this bird is peculiar, resembling the bleating of a goat, and is produced during its descent from a great height, and may be heard when it is out of sight. It feeds in water meadows and in low lands among wet turnips, upon worms, insects, and occasionally minute seeds. The beak is employed in searching for food, being pushed into the earth. It is endowed with great sensibility, and becomes a delicate organ of touch, by which the bird is enabled to discover its prey. The nest is generally placed in the vicinity of marshy grounds, amongst heath or long grass, and consists of a few dead leaves or dried grass. Eggs 4

in number, of a pale yellowish or greenish-white tint, with brown spots; length 1½ inches. Beak about 3 inches long, dark brown at the end, pale brown at the base; eyes dark brown; head dark brown, with a streak of pale brown in centre; neck spotted with brown; back dark brown; belly and breast whitish; legs and toes greenish-brown; length 10 or 12 inches; weight 4 or 5 ounces. The plumage of the male and female is alike; but the latter is the larger in size. The young snipes grow very fast, and are often larger than their parents before they can fly.

Uses. This bird possesses a most delicate flavour, and when young, fat and in season, as from October to February, is light and digestible. It is cooked along with the *viscera*.

THE WOODCOCK.—WOODSNIPE.

Scolopax Rusticola.—Scolopacidæ.—The Curlew and Sandpiper Family.—This bird, though it frequently breeds in this country, is generally considered a winter visitor. A north-east wind favours the descent of woodcocks upon our coast, from Norway, Sweden, &c. At this period they are generally in high condition; and fly in flocks at a great height in the atmosphere, the females generally preceding the males. This bird generally feeds during the night, and reposes during day in the dry grassy bottoms of brakes and woods. Earth-worms form its principal food, and it obtains them by digging its beak into the ground. The nest is made in woods and formed of dead leaves, in a dry and warm situation. Its eggs are white with a yellowish tint, mottled with greyish-brown spots; about 1¾ inches long, and 4 in number. Beak about 3 inches long, brown, darker at the tip; eyes hazel, large and convex; the plumage is a mixture of various shades of brown; nape of neck having two

transverse wood-brown bars; beneath, yellowish white, with brown bars; tail of 12 feathers, black, tipped with grey above and white below; legs and toes livid-brown; claws black, length 14 inches, weight about 12 ounces; female the larger. Mr Yarrell states that woodcocks about double the weight mentioned have been met with.

Uses. The woodcock is a bird in high estimation for the table, the flavour of its flesh being considered superior and very agreeable. It is generally roasted, and the *viscera* are sometimes retained. When in good condition, as during winter, and kept until it becomes sufficiently tender, the flesh is moderately digestible. The legs and intestines are considered delicate morsels. The skin is very tender.

The Great Snipe—*Scolopax Major*—is sometimes confounded with the common snipe, on account of their similarity to one another. It is considerably larger, and may be recognised, while on the wing, by its tail being spread like a fan. Mr. Yarrell states that these birds are easily shot, from their steadiness of flight. During autumn they are very fat and are considered "most delicious eating."

THE RUFF.

Machetes Pugnax.—Scolopacidæ.—The Curlew and Sandpiper Family.—The ruff is a summer visitor of this country; but it is much more scarce, since the draining of the fens in England. The young birds make their appearance in small flocks. At one period a considerable trade was carried on in the catching of ruffs. This is done by nets, chiefly in the fens of Lincolnshire, during the month of September. The young birds are afterwards fattened on bread and milk, boiled wheat or hempseed. This bird is exceedingly pugnacious, and fights for love as well as for food. The nest is formed of coarse

grass, in a swampy piece of ground; eggs 4 in number, of an olive colour, with brown spots and about 1½ inches in length. In the wild state, the ruff feeds on insects and worms. The male is much larger than the female or reeve; and is characterised, during summer, with a ruff about the neck, and it varies in colour. The colour of the female is pretty uniform. Length of the ruff 12 inches; weight from 6 to 10 ounces.

Uses. The ruff when fattened, which process is generally accomplished in two or three weeks, is considered the most delicious of all birds, being sold at a high price. It is frequently dressed for the table along with its *viscera*. When the bird is young, the flesh is tender, nutritive and digestible.

THE LANDRAIL.—CORN CRAKE.

Rallus Crex.—Rallidæ.—The Rail Family.—The landrail generally visits this country during summer. It is found in corn-fields, meadows, long grass, beds of reeds, and is well known by its peculiar note or creak, which is heard at a great distance. The male bird is the caller, and he continues his note until he discovers a mate. Its food consists of worms, snails, slugs, insects and seeds. It flies slowly, and when flushed generally takes refuge in the nearest covert. It trusts more to its feet than its wings. It leaves this country during October and flies to a warmer climate. It is abundant on the Continent of Europe, and has been found in Africa. During partridge shooting, landrails are frequently killed by sportsmen among seed-clover. The nest consists of dry plants and is placed on the ground among grass, clover or green corn. Eggs from 7 to 10, of a pale reddish-white colour, spotted with grey and brown; length 1½ inches. Beak pale brown; eyes hazel; margin of eyelids greenish-black; cheeks ash-grey; plumage blackish-brown above,

each feather having a broad yellowish-brown margin; wing-covers reddish chesnut; legs, toes and claws yellowish-brown; length about 11 inches; weight 6 ounces. Females rather smaller than males.

Uses. The flesh of this bird is white, tender, and when fat and in good condition, very digestible. Mr. Yarrell states that "landrails are considered most delicate as articles of food, and in such high estimation that two landrails are said to be a present for a queen."

According to Drayton, "the Rayle seldom comes but upon rich men's spits."

The Spotted Crake—*Rallus Porzona*—is much less abundant, more aquatic in its habits, and a smaller bird than the landrail. It is more numerous in France, where it is much esteemed for the delicate flavour of its flesh.

The Water Rail—*Rallus Aquaticus*—is found in the marshy districts of Britain; and takes the wing with difficulty. Its flesh is excellent, and by some considered little inferior to that of the landrail. Weight about 4 ounces.

THE MOOR-HEN.—THE WATER-HEN.

Gallinula Chloropus.—Rallidæ.—The Rail Family.—This bird is common near lakes, marshes, old water-courses, and among the rushes and willows of slow rivers. It swims and dives readily. Its movements in the water are accompanied with a nodding motion of the head, picking up by this means vegetable substances, first on one side, then on the other. Its food consists generally of aquatic plants, small fishes, worms, slugs and insects. After rain, it walks along the meadows searching for some of these animals, and may be recognised by the jerking up of its tail and showing the white under tail-coverts. The water-hen is capable of an extended flight; but seldom avails itself of this among the rushes. It

has been tamed, so as to pick crumbs of bread thrown down at the foot. During hard frost, moor-hens resort to plantations that are in the neighbourhood of running streams, and roost on fir-trees, &c. The nest is generally built on stumps of trees, among long grass, near water. Eggs 7 or 8 in number, of a reddish white colour, with orange-brown spots; length nearly $1\frac{3}{4}$ inches. Beak yellowish-green, its base and the naked patch on the forehead red; eyes reddish-hazel; the back, wings, rump and tail dark olive-brown; beneath bluish-grey; legs and toes green, with a red garter above the knee. Length 13 inches; weight about 15 ounces.

Uses. The flesh of the water-hen is agreeable and well flavoured when it is in good condition. It is however somewhat allied to the anserine or goose family in flavour; and is not so easily digested as the common rail.

The Common Coot—*Fulica Atra*—belonging to the *Lobipedidæ* or Lobe-footed Family, is larger and much coarser in flavour than the water-hen. Its flesh is oily and has a fishy taste, but is eaten in many places. The disagreeable flavour can be diminished, it is said, by taking off the black down with resin and boiling water, and afterwards soaking the bird in spring water for twelve or twenty four hours.

THE WILD DUCK AND MALLARD.—THE DOMESTIC DUCK.

Anas Boschas.—Anatidæ.—The Duck Family.—The wild duck is now less abundant in this country than it was formerly, which is chiefly owing to the greater extension of draining. It feeds on seeds, worms, insects and small fishes. It is a native of this country, the greater part of the northern hemisphere, and North America. The wild duck is generally considered the origin of our ordinary domestic variety; although in

some of their habits they differ materially. The nest is built on the ground, sometimes on the margin of a river or lake, and is composed of grass lined with down. The wild duck is monogamous, while the domestic variety is polygamous. It breeds early in the season. Eggs from 10 to 18 in number, of a greenish-white colour, and more than 2 inches in length. The young duck is unable to fly before it is eight or ten weeks old. Bill of the wild variety has a yellowish tint; eyes hazel; head and neck green, ending in a white collar; breast and upper back brownish; wing-covers with a white band edged with black; the fore middle tail-feathers velvet black and curled upwards; legs and toes orange-yellow; length about 24 inches; weight 40 ounces. Female of a brown colour; throat white; the middle tail feathers not curled upwards; about 22 inches in length. The male or drake changes his splendid plumage once a-year; and is scarcely distinguishable from the female for some weeks during July and August. Wild ducks are frequently taken with *decoys;* a contrivance by which they are allured, by trained ducks, into a tunnel terminating in a net. Immense quantities of this and other species are thus caught in the fens of Lincolnshire. The domestic duck is generally larger and more fat, its legs are stronger and their yellow colour less brilliant. It feeds upon grain and slops of all kinds, whether animal or vegetable.

Uses. The flesh of the full-grown domestic duck is strong in flavour, oily, frequently more tough, hard and less agreeable than that of the common fowl. It is difficult of digestion; but is a favourite with many persons. Young ducks are more easily digested, their flavour is agreeable and they are in season during summer. Although the young duck is rather more difficult of digestion than the chicken, the qualities of these two birds do not differ materially. The egg of the duck is nutritive and digesti-

ble but not so agreeable in flavour as that of the domestic poultry. The flesh of the wild duck is tough and requires to be kept for a considerable time before use. The flavour is strong and rather fishy; but it is highly estimated by many persons.

THE MUSCOVY DUCK—*Anas Moschata*—indigenous in South America, is also domesticated and common in our poultry yards.

THE TEAL.

Anas Crecca.—*Anatidæ.*—THE DUCK FAMILY.—This bird is one of the smallest of the duck family. It regularly migrates from the north of Europe to this country about the end of September, and during the winter; returning in spring, although many remain and breed here during summer. It feeds on grasses, seeds, insects, &c. The flight of teal is very rapid. They are taken with *decoys* and other means, in considerable numbers, during the winter months. The nest is generally placed among rushes; eggs 10 or 12 in number, of a whitish-yellow tint, about $1\frac{3}{4}$ inches long. Beak blackish; eyes hazel; head chesnut; a green band, extending from the eyes down each side of neck, edged with two white lines; lower part of neck, in front, partly covered with circular black spots, on a white ground; feet grey; length about $14\frac{1}{2}$ inches; weight 14 ounces. Plumage of female brownish.

USES. The flesh of the teal resembles that of other wild ducks, but is by many considered superior; and Mr. Yarrell characterises it as "one of the best as an article of food." The same author states that the yellow tinge on the white feathers of the breast, in the teal, wigeon, pintail, wild duck and other wild water-fowl, indicate that they are young birds of the year; and that they are superior in their qualities as food.

THE WIGEON.

Anas Penelope.—Anatidæ.—The Duck Family.—This bird is abundant on all the British coasts, as well as in the interior, on the margins of rivers, lakes, fens, &c. Its habits are similar to those of the wild duck; but it is a more familiar bird. It feeds chiefly on a short species of grass; and migrates northward in March and April during the pairing season. The note of the wigeon is a shrill whistle, and hence it has been named the whistler. The eggs have a rich cream-white colour, and are about 2 inches in length. Bill and feet brownish-black; eyes dark brown; forehead white; cheeks and hind part of neck rich reddish chesnut; wings white, green and black; breast and belly white; length 18 inches; weight 24 ounces. Head and neck of female brown, and speckled with dark brown spots. The young male birds of the year resemble, for a time, the females in plumage.

Uses. From the great numbers of this bird which are taken in some parts of the country, it is plentiful, and much esteemed for the table. The flesh, though rather dry, has a superior flavour, and is more tender and digestible than the duck or goose.

The Pintail Duck or Cracker—*Anas Acuta*—is remarkable for the elongation of its two middle tail-feathers. It is caught with the *decoy* during winter, and weighs about 24 ounces. It is considered an excellent bird for the table.

The Pochard or Dun Bird—*Anas Ferina*—is distinguished from the other species of ducks by the red colour of its eyes and head. It is not so elegant in form as the wild duck, walks ill, but swims and dives very expertly. It is taken by a species of decoy-net. Weight about 28 ounces; length 19 inches. The flesh of the

pochard is considered excellent, particularly when it feeds on vegetables in the neighbourhood of rivers and fresh water.

THE GREY-LEGGED GOOSE.

Anas Anser.—Anatidæ.—The Duck Family.—This species, although now very scarce, is believed by ornithologists to be the chief origin of our domestic goose. It is found a permanent resident in Lincolnshire. Beak of a pale flesh colour; eyes brown; head, neck and back ash-brown; belly and under surface of body white; legs and toes of a dull flesh colour; claws black; length 35 inches; weight about 10 pounds. Female smaller than male; eggs 8, of a yellowish-white colour. In the domestic state it is greyish in colour; but the ganders are often white. There are, however, numerous varieties in point of colour.

THE BEAN GOOSE.—WILD GOOSE.

Anas Segetum.—Anatidæ.—The Duck Family.—This species appears during winter in greater numbers than any other, with the exception of the Brent goose. It frequents the northern counties of England and Wales; and sometimes breeds amongst the heath that covers the small islands in various lochs. It feeds on the young shoots of plants, roots, pulse, grain, &c. The eggs are fully 3 inches long, and of a dull white colour. Bill $2\frac{1}{4}$ inches long, pointed, the *nail* (supposed to resemble a horse-bean), edges and base black, middle portion orange; eyes dark brown; back greyish brown; neck, breast and belly white; legs and toes orange; claws black; wings reaching beyond the end of the tail; length 34 inches; weight about $6\frac{1}{2}$ pounds. Wild geese assume an angular form when on the wing; and those who are aware of this fact can detect the flock at a great distance. The

letter < according to Mr. Yarrell, placed horizontally, the angle in advance, will represent their arrangement.

THE BRENT GOOSE.

Anas Bernicla.—Anatidæ.—The Duck Family.—This is the smallest species of goose that visits Britain during winter. It passes the greater part of its time on the coast, and is rarely found in the interior. It feeds chiefly on marine vegetables. When the flock is numerous, the cry of these birds is said to resemble that of a pack of hounds. Eggs greyish-white, about 2¾ inches in length. Bill 1¼ inches in length, black; eyes almost black; head small and black; neck and breast black; a white patch on each side of the neck; back, wing-covers, &c., brownish black; legs, toes, and claws black; length 21 inches; weight 2¾ pounds. Female a little smaller than male; plumage brownish.

THE LAUGHING GOOSE.

White-Fronted Goose—*Anas Albifrons*—is characterised by its call, being like the laugh of a man, and also by the breast and belly being white. Weight about 5 pounds.

There are several other species of the wild goose visitors of this country, but which are of less value, on account of their rarity or their inferiority as aliment. Some foreign species, introduced into this country in a state of domestication, have again assumed the wild state in Britain. Dr. Fleming mentions three domesticated foreign species. 1. The Egyptian Ganser or Gambo Goose, *Anas Gambensis*, a beautiful bird introduced from Africa. Bill red; throat, cheeks and upper part of head white; back, rump and tail glossy black. 2. Canada Goose, *Anas Canadensis*. Bill, head, neck, and tail black; a white crescent on the throat; back greyish brown; belly

and tail covers white. 3. CHINESE, SPANISH, GUINEA or SWAN GOOSE, *Anas Hispanicus*. "Bill orange at the base, with a large knob; a wattle under the throat; a dark brown stripe from the nape to the back; deportment stately."

DIETETIC QUALITIES OF THE GOOSE.—The various species of wild goose which have been noticed, are esteemed by many as a high flavoured, nutritious, stimulant and agreeable aliment. The Brent goose, although the smallest, is the most numerous, and considered excellent in quality. The white-fronted goose is also a good bird for the table. The flesh of a wild goose is generally somewhat tough, strong and sometimes fishy in flavour, nutritious but difficult of digestion. It is not adapted for those who have delicate digestive organs, unless the bird be young.

The tame or domestic goose is in general more tender, but is often loaded with fatty matter, which renders it very difficult of digestion. The mode in which some of these birds are fed is very objectionable. They are cooped up in a crib, and fed upon malt, barley meal, oats and milk, with a small allowance of drink. When an enlarged liver is required, they are confined in a narrow crib, crammed with fat meat, and exposed to a high temperature. The Strasburg pie contains a portion of the diseased liver of a goose; it is notwithstanding considered a great delicacy. The flesh of the tame goose is of the finest quality during the last three or four months of the year, but the young birds are excellent in summer. The egg of the goose is rather strong and oily in flavour, but very nutritious, and not disagreeable to many persons. The feathers and quills are of considerable value, and these birds are subjected to the disagreeable process of plucking, two or three times a-year. A large trade of this kind is carried on in Lincolnshire. In Languedoc and other parts of France, the fat goose is often preserv-

ed for "the winter food of genteel provincial families."

THE SOLAND GOOSE.—THE GANNET.

Pelecanus Bassanus.—Pelecanidæ.—THE PELICAN FAMILY.—The gannet is well known on many parts of our coast, particularly in the isle of Ailsa, Bass Rock, Frith of Forth, St. Kilda, &c. It is considered a stupid bird, hence the name *booby* which is sometimes given to it. It is easily captured, particularly when young. It is rather long-lived, and feeds exclusively on fishes, particularly herrings, pilchards, sprats, &c. In securing its prey, it rises to a certain height in the atmosphere and darts perpendicularly upon the fish, which it rarely fails to secure. The nest is formed of sea weeds and grass. One egg is deposited in it, which is white with a blue tint, and fully 3 inches long. Naked skin of the face blue; eyes yellowish; bill horny, greyish-white, about 6 inches long; plumage white; legs and toes black; length nearly 3 feet; weight about 7 pounds; and rather less in size than the domestic goose.

USES. The flesh of the old gannet is rank and fishy in flavour; but that of the young bird is more agreeable, and is used in many places on account of its low price. It is nutritive, but, as it abounds with oil, difficult of digestion. The egg is esteemed by many, and is in regular consumption. The feathers are soft, white, and are employed in the manufacture of feather-beds.

THE RAZOR-BILL.—*Alca Torda;* and the PUFFIN.—*Alca Arctica*—belonging to the *Alcadæ* or *Auk* family, are also natatory birds of the edible kind. Their flesh is oily and has a fishy disagreeable taste, but when pickled with spices it is more agreeable and digestible. The puffin was formerly allowed to be eaten during Lent. The green-coloured eggs sold in London under the name of puffin

eggs are said to be tolerably good, and have very little of a fishy taste. It is probable that those of several species of this family are sold under this name. Eggs of this description, or those of rock-birds, are collected in large quantities on the cliffs at different parts of the coast, by fishermen, who are secured from falling by ropes attached to the ground above.

REPTILES.

THE GREEN TURTLE.

Chelonia Mydas.—Chelonidæ.—THE TURTLE FAMILY.—The green turtle, so called from the greenish colour of its shell, is the largest of this family of reptiles, being sometimes from 6 to 7 feet long, and weighing seven or eight hundred pounds. It is also possessed of great strength, and it has been stated that one of large size can walk while supporting five men on its back. Its ordinary weight, however, is from 150 to 200 pounds. It inhabits the sea; but being amphibious, requires to come to the surface of the water for respiration, and it can live without food for a long period. It is abundant in the West India islands, South America, &c., and frequents the water of the coasts and mouths of rivers. It swims with its head above water, and feeds on marine plants. This reptile frequently travels a long distance to the various coasts for the purpose of depositing its eggs on the sandy shores. This is done at night very secretly, and to the amount of 80 or 90 at one sitting. When the process is finished, the hole in which they have been deposited is carefully covered up, and she returns to the sea; but the sitting is repeated two or three times, at the distance of fifteen days. The

young turtles are hatched in three or four weeks, and run directly to the sea; but many of them are devoured by birds or other enemies. The eggs of the turtle are round, covered with a tough white skin, about the size of a hen's egg, and are eaten as food. The shell of the turtle does not enclose the head and feet, the latter being long and resembling fins. The green turtle is distinguished by its thirteen greenish hexagonal plates, but they are of no value.

Turtles are generally captured when they first go on shore to deposit their eggs; for they become lean and unsavoury after this process is completed. They are gentle in disposition, and are usually caught while on the beach digging their holes, by turning them on their backs, a position from which they can only with great difficulty recover themselves. After a sufficient number have been thus fixed, they are carried away at the convenience of the captors. They are also caught by divers, while floating asleep on the surface of the water, and by the harpoon.

Uses. The flesh of the turtle is whitish, somewhat like veal, rich, gelatinous, and combined with a large quantity of green fat. It is generally considered nutritive and very delicious, although slightly musky in flavour. It is rather difficult of digestion, which is owing chiefly to its impregnation with fat; and is therefore not well adapted for those who are liable to indigestion. Soup made from it has been recommended for the nutriment of persons affected with consumption, hectic and cutaneous diseases; this opinion is however problematical. The flesh is frequently salted, and may be preserved for a long period; and in this state it is used in the West Indies and America. It is prepared for the table in various ways, namely, by the formation of a soup, broiling, &c. According to Mr. Donovan, a simple steak broiled or fried is one of the best forms of

cookery. In Jamaica, the turtle is preserved alive in parks, and is said to be sold at a less price than beef or mutton. London is supplied with live turtle from this island, as wells as from others in the West Indies. The eggs are also considered a delicacy, and differ, according to Mr. Donovan, from those of a bird "in one striking particular, that the albumen, if such it may be called, does not coagulate by boiling." The flesh of other kinds of sea-turtle is inferior in flavour, and sometimes, it is said, not wholesome; although the loggerhead has been considered by some writers equal to the green turtle.

THE LAND TORTOISE.

Testudo Græca.—Testudinidæ.—THE TORTOISE FAMILY.—The tortoise is common on the coasts of the Mediterranean; but in this country it is generally reared in gardens, and lives upon milky plants, fruits, insects and worms. It is quite harmless, but if attacked it becomes a formidable antagonist, from the great strength of its jaws, and it can bear an immense weight upon its back. It is remarkable for longevity, and tortoises have been known to attain the age of 200 years. It is also very tenacious of life, and can survive for some time without the head. It lives in a dormant state during the winter months, in a hole which it has dug in the earth, and emerges from it at the approach of spring. It eats little at first, but during summer is very voracious. The tortoise is oviparous, and the eggs are 4 or 5 in number, being few when compared with those of the sea-turtle. They are deposited in a small hole by the female; and after covering them with leaves, she allows them to be hatched by the heat of the sun. They are rather smaller and longer in shape than those of the hen, being somewhat like pigeons' eggs, are invested with a soft white

covering, and composed, like those of birds, of the albuminous white and the yolk. This, like other tortoises, is enveloped in a double shell, with openings at both ends, through which project the head and neck, the tail and four feet. These shells are composed of pieces analogous to the bones of the chest in vertebrated animals. The shell is wide and equally arched; plates raised, striated on the edges, and studded with yellow and black spots. The tortoise measures about a foot in length, but is sometimes larger.

Uses. The flesh of the land tortoise is gelatinous, rich and agreeable, similar to that of the sea-turtle, although it is generally considered inferior in flavour. It is frequently used in Italy, the Levant, &c., for making soups; and the eggs are considered nutritive, and nearly as good as those of the domestic hen. The Greeks use both the flesh and the eggs during Lent, and drink the blood in its raw state.

THE EDIBLE FROG.

Rana Esculenta.—Ranidæ.—The Frog Family.—The edible or green frog is abundant in the different countries of Europe, though less so in Britain than the common frog. It is greenish above, with three longitudinal yellow lines; below, whitish with black spots; back arched or protuberated; fore-feet with four divided toes; hind-feet with five webbed toes. It spawns about the month of June, and the young attain their full growth in about four years, and live to the age of sixteen or seventeen. It is very tenacious of life, and survives for a considerable time in a mutilated state. It is also very voracious, and feeds on worms, snails, and even birds, mice, &c., which are swallowed in the entire state.

Uses. The flesh of the frog is light, digestible, moderately nutritious, and its flavour is said to resemble

that of the chicken. The "hind quarters" are most esteemed, and the form of dressing generally recommended is the fricassee. The other parts of the frog are employed in the formation of a soup, which is highly recommended by some authors for consumptive persons. Frogs are consumed in immense quantities at Vienna and some of the other large cities of Europe. They are brought from the country and placed in conservatories, or large holes in the ground, four or five feet deep.

FISHES.

THE PERCH.

Perca Fluviatilis.—Percidæ.—THE PERCH FAMILY.—This fish was known to the Greeks and Romans, and is common in the rivers and lakes of the temperate regions of Europe. It feeds upon insects, worms, &c., and is remarkably voracious, being easily caught by the angler. It is capable of living for some hours out of water. Mr. Yarrell states that, in Catholic countries, it is carried to market, and if not sold taken back to the ponds from which it was removed. Perches roam in shoals, descending and rising, and when exposed to a hot sun shading themselves among reeds or foliage. Shape oblong; fins spiny; back arched, of a greenish-brown colour; below, yellowish-white, with five transparent black bands on the sides; eyes golden-yellow; tail lunate. Its colours are brilliant and beautiful, and more attractive than its shape. Length 12 inches, weight about 1½ pounds; but it frequently exceeds this limit, having in a few instances been found to weigh eight or nine pounds.

Uses. The flesh of the perch is firm, white, agreeable and easy of digestion, being, like the trout, one of our best fresh-water fishes. Small perches, according to Cuvier, are generally fried; the larger being broiled or cooked by a short boiling. The natives of Holland form a soup with perches, along with parsley. The skins are made into a kind of jelly by the inhabitants of Lapland, and also into a species of glue. The scales of this fish have lately been employed in the manufacture of small ornaments.

THE STRIPED RED MULLET.

Mullus Sarmuletus.—Percidæ.—The Perch Family. —The mullet was held in high estimation by the ancients, and was sometimes sold at a very extravagant price. Cuvier mentions three that cost 5844 francs during the reign of Tiberius. The Romans preserved this fish in their *vivaria;* but its size was not much increased in these situations. Galen states that the liver, beat up with wine, was considered the most delicious part of a mullet, the head being next in estimation. It is reckoned migratory in its habits, but it is frequently caught along the southern coast of England, and is found at almost all seasons in London. It is generally taken with the trawl-net along with other fishes. Its food consists chiefly of the softer crustaceous and molluscous animals. It is upwards of a foot in length; body tinged with red; belly white; eyes pale yellow; sides striped with three or four longitudinal yellow lines. It seldom exceeds three pounds in weight, and is generally of smaller size.

Uses. The red mullet, although much less prized at the present day than it was in ancient times, is still considered a great delicacy, and obtains a high price. The flesh is firm, white, friable, agreeable to the palate, a

little *piquante;* and not being oily, easily digested. It is in best condition during the months of May and June; and the colours of the fish are then most brilliant. The liver is still an organ in great request. The mullets of Provence and Toulon are considered very superior in flavour.

THE PLAIN RED MULLET.

Mullus Barbatus.—Percidæ.—THE PERCH FAMILY.—This fish is smaller, and is distinguished from the striped red mullet by its almost vertical profile, its deeper red colour on the back and sides, which has a slightly carmine tint; while the belly is silvery-white, without yellow lines. It is an inhabitant of the Mediterranean, and is rarely found on the British coasts. Its habits and dietetic qualities are similar to those of the striped red mullet.

THE RED GURNARD.

Trigla Cuculus.—Triglidæ.—THE GURNARD FAMILY.—This fish is very common on the English and Irish coasts, and is caught by the trawl-net, in deep water. It seldom exceeds 12 or 14 inches in length; head nearly square; cheeks covered with long plates; colour when fresh, bright red; sides and belly silvery white; fins reddish-white, with a black spot on first dorsal. It is very tenacious of life, but is by no means a prepossessing fish in appearance. It feeds on crustaceous animals.

USES. Mr. Donovan observes that the gurnard is considered by many persons a fourth-rate fish, although it is now a greater favourite. According to Baron Cuvier the flesh is firm, of an agreeable taste, and in France is preserved in olive oil. The gurnard, according to my experience, is greatly inferior to many other fishes in ordinary use, possessing rather a strong and oily flavour,

although it is by no means disagreeable or very difficult of digestion. It is in best condition for the table during October and the winter months.

THE MACKAREL.

Scomber Scomber.—Scomberidæ.—THE MACKAREL FAMILY.—Cuvier states that the mackarel family of fishes is one of the most useful to man, on account of their agreeable taste and size, but especially from their inexhaustible reproduction, which makes them easy of acquisition by fishermen. The family of herrings can alone be compared to them in these respects. Some authors consider this fish migratory in its habits, making long voyages from north to south at one period, and the reverse at another. Mr. Yarrell, on the other hand, is of opinion that it inhabits almost the whole of the European seas, and by a law of nature is impelled to visit the shallower parts at a particular season. The mackarel abounds in the British and Irish seas, but is not common in Scotland.

It is caught from March to June, by the drift-net, but also by the hook and line. By the first method, an astonishing amount of fishes is sometimes taken. Mr. Yarrell states that the value of the catch of sixteen boats from Lowestoffe, on the 30th June, 1821, amounted to £5252. It spawns in June, and five hundred and forty thousand ova have been contained in one fish. It is very voracious, and is supposed to feed chiefly on young herrings or sprats, and even to be fond of human flesh.

The mackarel is a handsome and beautiful fish, about 15 inches long; of a tapering form, particularly the males; bluish-green above, with dark transverse bands; beneath silvery white, with golden tints; teeth very small and numerous; under jaw longest.

USES. Mackarel dies instantly on leaving the water, and very soon runs into a state of putrefaction. On this

account, according to Mr. Yarrell, mackarel have for nearly two centuries been allowed to be cried through the streets of London on Sundays. The fish must either be used within a short period of its being taken, or subjected to the process of salting. The average weight is nearly two pounds, but those of large size are not considered the finest in quality. They are in best condition during May and June, and their flavour is then superior to those taken in autumn or earlier in spring. The flesh of mackarel is white, firm, moderately tender, of an agreeable flavour, and it contains a fine oil, which is sometimes collected for the use of curriers. Although very nutritive, it is somewhat difficult of digestion, particularly by dyspeptics, delicate individuals and convalescents. Broiling is the mode of cookery generally adopted, as its flavour is thus better preserved. It forms an excellent dry salt-fish, and when pickled is much esteemed.

THE TUNNY.

Thynnus Vulgaris. — *Scomberidæ.*—THE MACKAREL FAMILY.—This fish was known to the ancients, and much esteemed by the Romans. It chiefly frequents the Mediterranean with its gulfs. It is more rare on the British coasts, and when found in our seas it is generally believed to have been in pursuit of herrings. The food of this fish consists of herrings, pilchards, &c. Tunnies are caught with nets, in large quantities, when frequenting the shore to deposit their spawn, during the months of May and June. These nets are of a peculiar construction, of great strength, and of such size, according to Dr. Bushnan, that twenty vessels might be filled by a single cast. The same author remarks, that the numbers of this fish which pass through the Bosphorus, in performing their periodical migrations, are almost incredible ; an immense amount, principally of young

tunnies, being then taken with very little trouble. The fisheries are carried on chiefly by the Sicilians, who export a considerable quantity of the dried fish; but also by the inhabitants along the coast of the Mediterranean. This fish is said to constitute the principal aliment of the people of Bithynia. The tunny is cured by cutting the flesh into slices, washing it with brine, and then packing it in barrels with alternate layers of salt. It sometimes attains a very large size, and Mr. Yarrell mentions one that measured nearly 8 feet in length. It seldom, however, exceeds 4 feet in length; its general form is similar to that of the mackarel, being much larger, and more rounded. Upper part of body, dark blue; belly, greyish-white, with silvery-white spots; sides of head white.

Uses. The flesh of the tunny has the colour of beef, but when boiled becomes paler. It is very firm, and its taste resembles that of the salmon, being considered very delicious in flavour. It is dressed in various ways, by frying, broiling, &c. Soups and pies are also made from it, the latter being very celebrated in France. It is preserved in salt and oil, and eaten cold like pickled salmon. Cuvier remarks that though the fresh or seasonably salted tunny is salubrious and agreeable, yet, when it becomes putrescent, its bones reddish-coloured, and the flesh acrid in taste, it causes diarrhœa, pains in the stomach, and even death if much has been swallowed. He recommends that this fish, even the most fresh, ought to be sold within twenty-four hours. The flesh of the tunny is highly nutritive, and in this respect resembles that of the salmon; but like the mackarel, it is best adapted for those who have sound digestive organs.

THE DOREE.

Zeus Faber.—*Scomberidæ.*—THE MACKAREL FAMILY.—This fish is supposed to have derived its name *doree*

from its yellow tint, and was called Zeus or Jupiter by the ancients. At one period it was considered a sacred fish, as it bore on its sides the marks of St. Peter's or St. Christopher's fingers, and hence its name has also been derived from the French word *adoree*. This fish, or the John Dory as it is also named, is found on the coasts of France and Spain, in Devonshire, and the southern parts of England and in Ireland, about Londonderry and Antrim. It feeds on the fry of other fishes, shell fish, &c. It is a wandering fish, often found following shoals of pilchards, and is common until the end of winter. It is caught with the hook and prefers a living bait; but is also taken with the net, sometimes in considerable numbers. It is very peculiar and rather ugly in appearance. The head is very large, occupying about one-third of the whole body, thus leaving only a small part that is edible. Length about 17 inches; body oval, compressed, olive-brown, reflecting in different lights blue, yellow and white; a round black spot on the side; eyes yellow. The average weight is about 4 or 5 pounds; but specimens weighing 10 or 12 pounds are occasionally brought to the London market.

Uses. Quin the comedian is stated by several writers to have brought the dory into celebrity in England, and it is mentioned as part of his history, that he once travelled from Bath to Plymouth for the purpose of eating it in the greatest perfection, and boiled in salt water. The flesh is firm and solid, and its flavour is considered by many persons remarkably delicate. It is nutritious and moderately digestible. Mr. Donovan states that it comes into season about the end of spring, and it is recommended to be kept one or two days before use, to diminish the toughness of the flesh.

THE COMMON OR GREY MULLET.

Mugil Cephalus.—Mugilidæ.—The Mullet Family. This fish is abundant along the southern coast of England, is frequently taken at Yarmouth, and has been traced to the Baltic and western coast of Norway. It is also met on the southern and northern coasts of Ireland. It ventures up rivers to some distance, delighting in shallow water during warm weather; but it always returns to the sea with the tide. The grey mullet is reckoned very intelligent, and frequently evinces great skill in avoiding danger, and in effecting its escape from a net or other place of confinement, by leaping or other means. The food of this fish occasionally consists of the sand-worm; but soft and fat decomposing matters are frequently preferred. It is often an object of sport to the angler, but he requires, it is said, to possess some dexterity, as the fish plunges violently. Length about 18 inches; weight from 1 to 5 pounds; but it is sometimes found much larger. Top of head and back of a greyish-blue colour; sides and belly of a silvery hue, marked with longitudinal parallel lines; lower jaw divided in the middle, by an ascending angular point; each jaw furnished with minute teeth; tail forked; eyes reddish-brown, pupil surrounded by a silvery line; a dark spot at the base of the three or four upper rays of the pectoral fin.

Uses. This fish is generally considered very inferior in flavour to the red mullet; although excellent in quality. Those taken in the river Arun, in Sussex, are said to be superior in flavour to those found in other streams. The roe pressed, dried and sometimes smoked, is employed in the manufacture of *botargo*, a favourite food or dainty in France, Italy, &c. The flesh of the grey mullet is sufficiently agreeable and digestible, and is in

best condition for the table during spring and the beginning of summer.

THE ATHERINE OR SANDSMELT—*Atherina Presbyter*—belonging to the mullet family, is often mistaken for the smelt on the southern coast of England, at Brighton, Southampton, &c., where it is plentiful. It is little known on the eastern coast, where the smelt is common. It resembles the smelt in appearance and size, but is distinguished from it by the second dorsal fin being supported by rays, while in the smelt, this fin is adipose and without rays. The flavour of this fish is agreeable, but is not considered equal to that of the smelt, and is more dry. When dressed along with the *viscera* it is reckoned by some authors a delicious fish.

THE COMMON CARP.

Cyprinus Carpio.—Cyprinidæ.—THE CARP FAMILY.—This fish was known to the ancients, but was not then held in the same estimation as in the present day. It is found in most of the rivers and lakes of the southern and temperate regions of Europe, but its growth is particularly cultivated in Austria and Prussia. The carp is supposed to arrive at a great age, even to 100 and 200 years, and when old the scales become grey or white. In Britain it inhabits rivers, lakes and ponds, but it thrives best when the current of a stream is not very rapid, and when the bottom is soft and muddy. It is extremely prolific, particularly in natural waters. The larva of worms, insects and some soft aquatic plants are believed to constitute the food of this fish. Carp may be partially tamed, so as to receive bread, boiled potatoes, &c., from persons who feed them. They are very tenacious of life when removed from the water, and it is stated that in Holland they may be kept alive for two or three weeks, if enclosed in a net containing wet moss.

This treatment is accompanied with a supply of bread steeped in milk, and an occasional affusion of cold water.

The carp is rather slow in growth, but it has been found ten pounds in weight before its tenth year, and is frequently caught of large size. It is very difficult to take this fish either by angling or the net, and this sport is so uncertain that the carp has been called, in some parts of the country, the river-fox. The body is of a golden olive-brown colour, and covered with large scales; belly yellowish-white; eyes of a golden hue; a barbule at each corner of the mouth; tail forked; fins dark brown.

Uses. Carp are by many persons much esteemed for their delicacy and flavour, but Mr. Yarrell considers them much indebted to the cook for these properties. The flesh is moderately nutritious and digestible, except when combined with too much fatty matter. A soup made with this fish was, at one period, prescribed in France and Italy for consumptive diseases. It is in best condition for the table from October to April.

THE GOLD CARP.

Cyprinus Auratus.—Cyprinidæ.—The Carp Family.—This species is called the gold or silver fish, and was introduced into Europe nearly two centuries ago. In China, the Cape of Good Hope, and the Mauritius, the gold carp are naturalised in ponds, rivers, &c. They are very prolific, if placed in ponds where the mean temperature is high, such as an engine-pond, &c. The young are dark-coloured at first, about five inches in length when a year old, but the fish is rarely found more than double this amount at any period of its growth.

Uses. The dietetic qualities of this species are similar to those of the common carp. It is not, how used

as food in this country, but is served up at table in the Mauritius.

THE GUDGEON.

Gobio Fluviatilis.—Cyprinidæ.—THE CARP FAMILY.—The gudgeon is generally found in rivers that have a gravelly soil, with shallows where the current of the water is increased. These fishes swim in shoals, and their food consists of worms, aquatic insects, &c. They rarely exceed 8 inches in length, and are easily caught by the angler with red worms, &c. They are also caught with nets, in large numbers, by the Thames fishermen, who keep them alive in well-boats until they can dispose of them. Body round; a barbule at each angle of the mouth; head, back and sides, olive brown, spotted with black; belly white; eyes orange-red; tail deeply forked; length about six inches.

USES. The flesh of the gudgeon is highly esteemed, and is considered easy of digestion. Is is stated by Dr. Willich, that when full of spawn the flavour of the fish is superior, and that March, April and May is the best season for taking them.

THE TENCH.

Tinca Vulgaris.—Cyprinidæ.—THE CARP FAMILY.—This fish inhabits chiefly lakes, ponds, &c.; but is not frequently found in our rivers. It is also found in clay pits, and in shallow waters, with muddy bottoms. It is more abundant in the lakes of the Continent than in those of Britain. The tench is exceedingly tenacious of life, and has been known to exist for years in a hole filled with mud. It is very prolific, easily preserved and transferred from one place to another. Mr. Yarrel considers tench a very useful stock for ornamental waters. It spawns about the middle of June, and its food consists

of the soft-bodied animals that inhabit fresh water. Body of a greenish-olive gold colour, thick in proportion to its length; fins dark brown; a small barbule at each angle of the mouth; body covered with small slimy scales; weight 4 or 5 pounds.

Uses. The flesh of the tench is rather insipid in taste, and inferior to that of the carp, although nutritious and moderately digestible. Mr. Yarrell states that when this fish is removed to stews, and fed on a mixture of greaves and meal, its flesh is nutritious and of good flavour. When it inhabits lakes or pools where the mud is fetid, the flesh sometimes acquires a disagreeable flavour. This, if suspected, is easily removed by keeping the fish alive in fresh water for a few days.

THE BREAM.

Abramis Brama.—Cyprinidæ.—The Carp Family.—The bream is found in many of the lakes and rivers of Britain and Ireland, as well as in those of the Continent. These fishes swim in shoals, and feed on worms, some vegetables, &c. They are very prolific and spawn in May. The breeding of this fish is chiefly cultivated for feeding pike and furnishing sport to the angler. Head and tail small; body deep and flat; scales of body small; general colour yellowish-white; eyes golden-yellow; cheeks and gill-covers silvery-white; weight 4 or 5 pounds.

Uses. The flesh of the bream is insipid, hard, not very digestible, and seldom brought to table. In some of the lakes in Ireland, bream are taken of large size, occasionally weighing twelve or fourteen pounds each. The poor people dry them, and eat them with potatoes. They are in best condition during spring and autumn.

THE ROACH.

Leuciscus Rutilus.—Cyprinidæ.—The Carp Family.—This fish is abundant in the rivers and lakes of the temperate regions of Europe; and vast shoals sometimes emigrate from Loch Lomond into the rivers. It is a gregarious fish, and feeds on worms, vegetables, &c. It spawns about the end of May. Upper part of head and back dusky greenish-blue, lighter on the sides; belly silvery-white; eyes yellow; cheeks and gill-covers silvery-white; scales broad and striated; length about 12 inches; the weight seldom exceeds 3 pounds.

Uses. The flesh of the roach is not much esteemed; but it is tolerably digestible and is considered light. It is in best condition during October, which month the Thames angler generally selects for catching this fish.

THE DACE.

Leuciscus Vulgaris.—Cyprinidæ.—The Carp Family.—This fish is somewhat similar in appearance and habits to the roach; but is not so generally found in our rivers. It feeds upon worms, &c., is gregarious and spawns in June. It rarely exceeds 9 or 10 inches in length; or weighs more than 1½ pounds. The body of the dace is oblong; head and back of a dusky blue colour; sides and belly whitish or silvery-white; eyes straw-yellow; scales smaller than those of a roach of similar size.

Uses. The flesh of the dace is rather insipid; but is moderately digestible, and preferred by many persons to the roach. It is used as bait for catching pike. On the inner surface of the scales of this fish, as well as of those of the roach, whitebait, bleak, &c., there is found a silvery pigment, which gives them a certain lustre. This pigment, particularly that procured from the bleak and whitebait, is employed in the manufacture of artificial

pearls, for beads, necklaces, &c. This trade has however rather declined of late years.

THE CHUB.

Leuciscus Cephalus.—Cyprinidæ.—The Carp Family. The chub is an inhabitant of the rivers of England and Scotland. It is a timid fish, lurking in the holes or deep quiet parts of running streams, near bushes. It feeds on worms, and may be caught with a large fly, &c., by the angler, who requires to conceal himself from view. It spawns about the end of April, or beginning of May. Body and head thick; upper part of back of a bluish-black colour; sides and belly bluish and silvery-white; eyes, golden-yellow; cheeks and gill-covers golden-yellow; scales large angular; length about 15 inches; the weight does not exceed 5 pounds.

Uses. The chub is said to resemble the carp, in dietetic qualities, but it is much coarser, and possesses little flavour. The roe is more esteemed than the flesh. It is considered in the best condition during the months of December and January. Broiling without removing the scales is recommended as the best mode of preparing it for table.

THE LOACH.

Cobitis Barbatula.—Cyprinidæ.—The Carp Family.—This little fish is common in our rivers and small streams; but is often not observed, as it conceals itself below stones, &c. It is very restless, swims rapidly, and is difficult to catch. Like the leech, it is said to indicate changes of the weather, from its peculiar agitation at these periods. The length of the loach is about 3 inches; body round; head, body, and sides studded with brownish spots, on a white ground; belly white; mouth small, furnished with 6 barbules, and hence its name *beardie;* eyes blue. It feeds on worms, insects, &c.; and spawns in March and April.

Uses. This fish is little used as food in Britain; but

in some parts of Europe, according to Mr. Yarrell, it is in such estimation for its exquisite delicacy and flavour, that it is transported from its natural rivers to waters contiguous to the estates of the wealthy. Its flesh is very digestible.

THE MINNOW or PINK—*Leuciscus Phoxinus*—possesses dietetic qualities similar to those of the loach; and though a very small fish, makes an excellent fry, according to Mr. Yarrell, when a sufficient quantity is obtained.

THE PIKE, GEDD OR LUCE.

Esox Lucius.—Esocidæ.—THE PIKE FAMILY.—The pike is common in Britain and Ireland; and is found in almost all our lakes and ponds and in many of our rivers. It is a very voracious fish, swimming very quickly and capturing its prey with astonishing rapidity. From this, it has been called the fresh-water shark. It devours all the smaller fishes, feeds upon serpents, frogs, rats, ducks, &c.; and even combats with the otter in the capture of its food. It is also said to have fastened upon large animals, such as the mule, and upon man. The pike sometimes attains a very large size, and one taken in Suabia is recorded to have weighed 350 pounds, its skeleton being 19 feet in length. In the British and Irish lakes it has been found to weigh from 50 to 70 pounds. It is also remarkable for longevity; the fish already referred to as of such extraordinary size, was 267 years old. It spawns in March or early in April; and at this period retires to a creek or ditch, connected with the waters it inhabits. The pike caught at Horsea Mere and Heigham Sounds, in the neighbourhood of Yarmouth, have long been celebrated for their quality and weight. They are taken by angling, or by the ligger, which is a long cylindrical float made of cork or rushes with a string wound round it. Body of the pike elongated, of an olive brown colour above, mottled with

green and yellow spots on the sides; belly silvery white with black spots; surface covered with small scales; lower jaw the longest, with numerous small teeth round the front, and in sides five or six, long and sharp; eyes yellow; dorsal fin placed very far back.

Uses. The flesh of this fish is firm, of tolerably good flavour, and rather nutritious. It is not difficult of digestion; but when large it is hard and dry. Dr. Willich states that when properly cooked it resembles boiled veal. According to Mr. Yarrell, the pikes of the Medway, when feeding on the smelt, acquire excellent condition, with peculiarly fine flavour. In Lapland and some other northern countries of Europe, large quantities of this fish are caught during the spawning season, being then more easily taken, and dried for future use. The roe, which sometimes contains an immense number of ova, is made into a *caviar* in some countries. Pike caught in rivers are generally preferred to those taken in ponds; and they are in best condition from autumn to the end of winter. Those that weigh five or six pounds, with bright showy colours, are considered the finest in quality. The pike is the *Lucie* of heraldry.

THE SALMON.

Salmo Salar.—Salmonidæ.—The Salmon Family.—This fish is very important, in as far as regards its extensive diffusion in the seas and rivers of Britain and Ireland and its value as an article of food. Salmon leave the sea and ascend the rivers during the summer months, frequently leaping up cataracts; the time varying according to the size of the lake and other circumstances not well ascertained. They then pair and form a furrow in the gravel for the deposition of the spawn. Dr. Fleming states that the number of ova sometimes amounts to 20,000. They return during spring to the sea; their favourite food there being the sand-eel; but they also feed on

small fishes, molluscous and other small marine animals. The salmon-fry or smolts leave the spawning furrow about March, being then about 3 inches long, and retire to pools. They afterwards proceed along the edge of the water to the estuary, retiring to the deepest part of the channel. During the following summer they re-appear in the estuary in the form of grilses, being about 3 pounds in weight and upwards. They ascend the rivers rather earlier than the adult fish. Their increase in size is very rapid; and this chiefly occurs during their residence in the sea, from their plentiful supply of food in that situation. Salmon-fishing is a highly important branch of industry in Scotland and Ireland; and it is to be regretted that its value has much diminished of late years, which is chiefly attributable to poaching during *close-time*. Salmon are caught by stake-nets in friths, estuaries and the mouths of rivers; sometimes in bag-nets or by means of yairs, which resemble stake-nets, but which are ocasionally constructed of wicker-work.

Weirs or small dykes, containing openings leading to enclosures, are also employed in the higher parts of rivers. Dr. Bushnan states that perhaps more salmon are taken by the coble and net fishery than by any other method. Several other contrivances are employed in salmon fishing, such as coracles or small boats, as in the Welsh rivers. Many are killed in Scotland by an instrument like a spear, called a *leister* or *waster*, by torch light, and during night; and frequently when they are unhealthy in condition. A considerable number of salmon are now caught by angling; and this is allowed in certain rivers after the time for net-fishing has closed.

A large proportion of the salmon caught in the Scotch rivers is packed in ice and sent to London; but many are pickled or otherwise preserved. This fish is now rare in the United States, although plentiful in some

parts of North America, such as Newfoundland. It is very abundant in Norway and the Arctic regions. The back of the salmon is of a bluish-black colour; sides lighter, more or less spotted above the lateral line; belly silvery-white. It rarely exceeds 3 feet in length; and its weight varies from 10 to more than 70 pounds.

Uses. The flesh of the salmon is reddish, rich, somewhat oily, and of very agreeable flavour. It is perhaps the most nutritive of all fishes in ordinary use; and more nearly resembles animal flesh in this quality than any other, and this is probably in proportion to the redness of the fibre. It is more difficult of digestion than the white fishes in common use; and on this account is not so well suited for those who have delicate digestive organs. It is in season during April, May, June, July and August; and a fish of moderate size, such as one weighing 10 or 12 pounds, is generally the finest in flavour. Grilse are more gelatinous than the full-grown salmon, and are considered rather inferior in flavour. They are, however, more quickly digested. According to Mr. Yarrell, the salmon, like other fishes that swim near the surface of the water, cannot be eaten too fresh, as the flavour and value diminish rapidly after capture. *Kippered* or salted salmon is very difficult of digestion, its texture being hard and consolidated.

THE SALMON TROUT.

Salmo Trutta.—Salmonidæ.—The Salmon Family.—This fish was at one period supposed to be the salmon in its progress to maturity; but is now considered a distinct species. It is distinguished by a difference in the gill-cover, the tail, and by the greater number and more slender form of its teeth. The colour above is dark bluish-black; beneath, silvery white; sides studded with irregular purplish-black spots, cruciform in shape. Mr. Yarrell states that when it is placed by the side of a sal-

mon, it is in comparison darker in colour in the body, but lighter in the fins. Its length is about 18 inches; weight about 3, but sometimes 5 or 6 pounds. It is plentiful in many of the rivers in Scotland, is the white trout of Devonshire, Wales and Ireland. Its habits are similar to those of the salmon; and it also ascends the rivers for the purpose of spawning. The food of salmon trout consists of small fishes, flies, beetles, &c. It is frequently caught by the angler with ordinary flies in the estuaries; but large quantities are taken by the sweep-net in some of the rivers in the north of Scotland, being more plentiful there than in the Tweed, &c.

Uses. The flesh of this fish is reddish, especially in those where the palate is dark-coloured; but it is sometimes white, the latter being generally considered inferior in flavour, although perhaps more light and digestible. In general digestibility and nutritive properties it resembles the salmon, but is rather less oily, and therefore better suited for those who have delicate digestive organs. Its flavour is considered decidedly inferior to that of the salmon.

THE BULL TROUT.—GREY TROUT.

Salmo Eriox.—Salmonidæ.—The Salmon Family.—This fish is abundant in the Tweed, and is sometimes named in that neighbourhood and northern districts Norway salmon. It ascends the rivers earlier than the salmon, and affords excellent sport to the angler, as it takes any bait or fly very readily. Its length varies from 18 to 24 inches; and it weighs from 3 to 6 pounds, although it sometimes attains the weight of 20 pounds. During the spawning season, the head of the male is olive-brown; body orange-brown, that of the females blackish-grey. The general colour, at other times, is similar to that of the salmon-trout; tail rounded or slightly convex.

Uses. The flesh of the bull-trout has a pale orange

or yellowish-white colour; and is decidedly inferior in flavour to that of salmon or salmon-trout. It is, however, much allied to these two fishes in digestibility and nutritive properties.

THE COMMON TROUT.

Salmo Fario.—Salmonidæ.—THE SALMON FAMILY.—This fish is almost universally found in the rivers and lakes of Britain. It spawns in October, and at this period passes up the stream. It feeds on the ova of the salmon, small fishes, shell-fish, flies, &c. It lives to a considerable age; and one has been known to live in a well in Dumbarton for twenty-eight years. It varies considerably in colour; this being supposed to depend on the qualities of the waters, the locality, and other circumstances. Its length is about 12 inches; weight from ½ to 2 or 3 pounds. Trouts weighing 14 or 15 pounds have been caught by angling, a performance, however, of some difficulty. Body of a yellowish-brown colour above, with purple and red spots; lower part of sides golden-yellow; belly silvery white; eyes silvery, with a pinkish tinge.

USES. The flesh of the trout is generally white, sometimes reddish, has a delicate flavour, is tender and very digestible. It is not so nutritious as that of the salmon, but as it contains little oil, it is lighter and more adapted for those who have delicate digestive organs. Mr. Yarrell considers the trout finest in appearance and flavour from the end of May till towards the end of September, from the superior quality of its food during this period.

LOCHLEVEN TROUT—*Salmo Levenensis*—is caught in Lochleven, the island of which is famous for being the prison-house of the unfortunate Queen Mary. It is generally described as a variety of the common trout; but Dr. Parnell and some other authors consider it a distinct species. The form of the fins and colour of the spots is

different, and the flesh has a red colour. It is a beautiful fish and much valued; but its fine flavour has of late fallen off. The injury to the feeding grounds, by the partial drainage of the loch, is supposed to be the cause of this inferiority.

THE SMELT.—THE SPIRLING.

Osmerus Eperlanus.—Salmonidæ.—The Salmon Family.—This fish is abundant in the estuaries of the eastern and western coasts of Britain. It spawns in March, near the junction of the fresh and salt water; and its food consists of small crustaceous animals, &c. The smelt is taken in great abundance at the mouths of rivers, or in estuaries, by means of small nets. The back is of a greenish-white colour; sides varied with blue; cheeks, gill-covers and belly silvery-white; head translucent; lower much larger than upper jaw; eyes silvery-white; length 7 or 8 inches; weight 2 or 3 ounces. It is distinguished from the atherine or sandsmelt, which in some respects it resembles, by the adipose fin, which is peculiar to the salmon family. In the smelt the adipose fin is without rays; while in the atherine the second dorsal fin is supported by numerous rays.

Uses. The smell of this fish is peculiar, particularly when newly caught, being compared to that of violets or cucumbers. It is much esteemed for its delicate flavour, the perfection of its odour indicating the freshness of the fish. Boiling is said to destroy its flavour; it is therefore generally sent to table fried. It is in good condition at all times, except during summer. This fish is sufficiently digestible and nutritious, although rather inferior in the latter quality to the salmon, salmon-trout, &c.

THE PILCHARD.—GIPSEY HERRING.

Clupea Pilchardus.—Clupeidæ.—The Herring Family.—The pilchard has sometimes been confounded

with the herring, as there is a great resemblance between these two fishes. It is found in several of the European seas; but is very abundant on the coasts of Devonshire and Cornwall. These fishes congregate about the month of July; but August and September are considered the most favourable months for the fisheries. They spawn about October, at no great distance from the shore. Like the herring, they are very capricious in their movements; and when near the coast assume the arrangements of a large army, but they rarely go against the tide. Pilchards feed on crustaceous animals, shrimps, &c. The fishery of pilchards is very extensive, particularly in Cornwall and Devonshire; and many thousands of individuals are engaged in it. These fisheries are carried on with scans and drift-nets; each of the latter being about 360 feet long and 36 deep, and calculated to enclose a shoal. Mr. Yarrell states, that an instance has occurred where ten thousand hogsheads have been taken on shore in one port in a single day, amounting to about twenty-five millions of living creatures. The fishes intended for exportation are pickled, and packed in barrels by pressure, which reduces their bulk to about one-third. A coarse oil, in the proportion of three or four gallons to a hogshead, is thus obtained. It may also be procured by boiling the fish in water. This oil is not adapted for many purposes, and is seldom used except as manure. The fish itself is also employed in this capacity, being considered very fertilizing in its action on the soil. The preserved fish are chiefly exported to the West Indies, and the ports of the northern Mediterranean coast. The length of the pilchard is from 9 to 11 inches; it is smaller and thicker than the herring, without teeth, and the scales are larger. Upper part of body bluish-green; sides and belly silvery-white; eyes yellowish-white; cheeks and gill-covers tinged with golden yellow, and striated.

Uses. The pilchard resembles the herring in taste and dietetic properties; but it is more oily, and consequently more difficult of digestion. It is, however, very nutritious, and, when the digestive organs are sound, a very wholesome and agreeable aliment, being milder in point of taste than the herring. Pickled pilchards, as being deprived of a portion of their constituent oil by pressure, must be considered lighter, in as far as this is effected; but the salting process, in general, renders the flesh of fishes more difficult of digestion.

THE HERRING.

Clupea Harengus.—Clupeidæ.—The Herring Family. —This valuable and well-known fish has given rise to considerable discussion respecting its extraordinary migrations; but it is now generally believed that herrings do not rendezvous, during the winter months, within the Arctic circle, as was formerly believed by some authors. During this period, they inhabit the deep water around our coasts, and approach the shore for the purpose of spawning, under the influence of heat and atmospheric air. Herrings are, however, very capricious in their movements; and many of our fishing stations experience great variations in their visits, both as to the time and amount of fishes. They spawn about the end of October or beginning of November. The young are abundant in the shallow water of our coasts during summer, and many remain during the winter, being sometimes caught with a trout-fly. While inhabiting the deep waters, the food of the herring is supposed to consist of minute marine animals; but when near the shore, they swallow limpets, flies, and even young herrings. The herring fishery of Scotland is a very important branch of commerce, as well as source of aliment to our common population. At one period, a bounty was given by Government in order to encourage this traffic,

and to bring British herrings to a level with those of the Dutch, who have long enjoyed a high reputation for the curing of these fishes. In the north of Scotland, herring-fishing is carried on to a very large extent, and the small town of Wick furnishes a large quantity. Herrings, when cured, are chiefly exported to Ireland, the West Indies, the Continent of Europe, India, &c. Although these fishes are consumed in immense quantities by man, and devoured in great numbers by other fishes and sea-fowls, they sometimes assemble in shoals of prodigious magnitude, and are caught or thrown by the tide on the beach in such abundance that there is not salt in the district sufficient to cure them. They are generally taken in drift-nets during a dark night; and considerable skill is required in arranging these, as the herring swims at various distances below the surface. The upper part of the herring has a fine blue colour, greenish when viewed in a different light; belly and lower part of the side silvery-white; lower jaw the longer, with 5 or 6 small teeth; length from 9 to 12 inches.

Uses. The herring dies immediately on leaving the water, and soon begins to putrefy, but this is easily ascertained by the disappearance of its bright colours. It is in perfection during summer, when full of roe; but after spawning, the flavour is insipid. The flesh of the herring, like that of the pilchard, contains a considerable quantity of oil; it is therefore very nutritious, but rather difficult of digestion, unless the stomach be perfectly healthy. At the same time, a moderate quantity of the fresh fish may be taken by most individuals with impunity, particularly if boiled in water. When salted, it is more difficult of digestion, if the texture be rendered hard; but if not spoiled, and if macerated in water for one or two days, so as to extract a portion of the salt and soften its texture, it is also in this state a very agreeable, wholesome, nutritive and valu-

able aliment. Of the various methods of cookery adopted in preparing it for the table, boiling is the best adapted for both the fresh and pickled herring, as there is enough of the fatty principle in the fish itself without any extraneous addition; and by this process it is more thoroughly softened and deprived of its salt than by frying or broiling. Pepper, or some other aromatic condiment, is a useful addition to herrings, particularly when fresh, as it tends to promote their digestion.

White Herrings—are cured, according to Mr. Donovan, by immediately removing the *viscera* where they are caught, steeping them in brine for a day, draining and stratifying them with salt in barrels.

Red Herrings—are first cleansed and salted, then hung up in sheds and dried for a month in the smoke of burning wood.

THE SPRAT.—GARVIE.

Clupea Sprattus.—Clupeidæ.—The Herring Family. —This fish has been confounded with the young of the herring and pilchard; but, according to Mr. Yarrell, it is easily distinguished from these by the strongly serrated edge of the belly. A sprat of full size is about 6 inches in length, and fully 1 inch in depth; tail deeply forked; scales large, round and deciduous; head and back of a dark blue colour, passing into a silvery-white on the sides and belly. Sprats are abundant in many of the estuaries of Britain and Ireland, and are often caught in immense numbers in the Thames and Forth. The fishing season commences in November, and continues during the winter months. They are sometimes caught with the same kinds of nets used in the herring and pilchard fisheries; but most frequently by what are called stow-boat nets.

Uses. The sprat resembles the herring in dietetic properties, being oily, nutritious, and moderately diges-

tible when not eaten in large quantities. It is a valuable fish for the support of the lower classes, as it is very cheap and plentiful during the winter months. Sprats are also salted, dried and smoked, being sometimes admitted to the breakfast-table of those who do not dislike their odour. They are also sometimes pickled as anchovies, and sold as such, although greatly inferior in flavour. When large shoals are caught, which cannot be otherwise disposed of, they are used as manure, forty bushels being required for the acre, according to Dr. Bushnan.

THE WHITEBAIT.

Clupea Alba.—Clupeidæ.—THE HERRING FAMILY.—This small fish has been considered by some authors as the young of the shad; but Mr. Yarrell has proved it to be a distinct species. The whitebait fishery in the Thames is carried on to a considerable extent, from the high estimation in which this fish is held by the inhabitants of London, who often visit Blackwall and Greenwich to enjoy a fish-dinner. It is caught chiefly during the months of June, July and August, and sometimes in September. Mr. Yarrell is of opinion that if the particular mode of taking this small fish was known to the fishermen, it would be found in some of the other rivers of the south and east coasts. It has been discovered in the Humble, and also in the neighbourhood of Queensferry, Scotland, and in the Solway Frith. It is taken in long bag-nets from vessels moored in the tide-way. The upper part of the back of the whitebait is of a pale greenish-ash colour; the cheeks, sides and belly are silvery-white. It feeds on crustaceous animals.

USES. This fish is considered a delicacy of the highest kind, particularly when cooked according to a certain method. Pennant states that it is reckoned very delicious when fried with fine flour.

THE SHAD.

Alosa Finta.—Clupeidæ.—The Herring Family.—This fish enters our rivers from the sea about the month of May, in order to deposit its spawn, and returns by the end of July. It is frequently caught in the Thames, is found on the coast of Norfolk, and in the Tyne. Its food consists of small fishes and crustaceous animals. The adult fish measures from 12 to 16 inches; top of the head and back of a dusky blue colour, with brown and green reflections; the eyes, sides of head and body silvery white, with a copper tint. It is distinguished from the allice shad, *alosa communis*, which is abundant in the Severn, by possessing teeth, lateral spots, and a small anal fin. Mr. Yarrell has named it the twaite shad, and it is sometimes called the mother of herrings, from its being larger in size than the latter fish.

Uses. The twaite shad seldom weighs more than two pounds, and its flesh is dry, full of bones, coarse and difficult of digestion. The allice shad of the Severn is much superior in flavour; and its quality improves in proportion as the fish has ascended the river. The shad resembles the herring in dietetic qualities, being rich, oily and not well adapted for those who have delicate digestive organs.

THE ANCHOVY.

Engraulis Vulgaris.—Clupeidæ.—The Herring Family.—The anchovy is abundant in the Mediterranean, has been found on the south western coast of England, and in the Baltic. It was well known to the Greeks and Romans, who prepared a sauce from it named *garum;* but this was also made from other fishes. It is about 4 or 5 inches long, but it sometimes attains the length of 7½ inches. The back is bluish-green, semi-pellucid; eyes, gill-covers, sides and belly, silvery-white; fins, greenish white, delicate in structure. It is easily recognised, according to Mr. Yarrell, among the species of the

herring family, by its sharp pointed head, with the upper jaw considerably the longest.

Uses. The anchovy possesses properties similar to those of other species of the herring family; but it is chiefly used for making the sauce known by its name. The bones of this fish are very soft, and its head contains a bitter matter, which as well as the *viscera* are removed when the fish is pickled. The pickled fish is imported from the Mediterranean ports, packed in barrels along with salt, and it is thought that a reddish coloured salt gives it a superior flavour.

Anchovy Sauce—is variously prepared, but generally contains butter, vinegar, wine, aromatics, &c. Its qualities may, therefore, be good or indifferent, according to the nature of its composition. It is imitated by the employment of sprats, with the addition of some red colouring matter, such as venetian red, bole Armenian, cochineal, &c., but this factitious sauce is very inferior in flavour. Mr. Donovan states that the anchovy is in greatest perfection during May, June and July.

THE COMMON COD.

Morrhua Vulgaris.—Gadidæ.—The Cod Family.—This valuable fish abounds in almost all the northern seas, as far south as Gibraltar; but it is not found in the Mediterranean. It is taken all around the coast of Britain and Ireland, and it is plentiful on the eastern side of the American Continent, and among its numerous islands. In Labrador and Newfoundland most extensive fisheries have long been established, are very productive, and supply a wholesome aliment to a large amount of people in various quarters of the world. The cod is very easily taken with almost any bait, and as it inhabits deep water, lines with hooks are generally employed. Mr. Yarrell states that from four hundred to five hundred and fifty fishes have been caught, on the banks of Newfoundland,

by one man, in ten or twelve hours. The cod taken at sea are sometimes preserved alive in well boats, and thus sent to the London market. This fish has been kept alive in salt water ponds, in different parts of Scotland, without injury to its healthy condition. There is one at Logan, in Galloway, the seat of Colonel M'Dowall, cut out of the solid rock and communicating with the sea by a fissure. Some of the various species of fishes confined there have learned to take food from the hands of their keeper, and one large cod-fish has lived in confinement, it is said, for more than twelve years. The food of the cod consists of small fishes, worms, crustaceous animals, &c. It spawns about February, and Dr. Bushnan states that nine millions of eggs have been found in the roe of a single individual of this species. It is therefore not to be wondered at that immense shoals of cod are found on the banks of Labrador and Newfoundland. It has been calculated that 10,000 British seamen are engaged in the Newfoundland fisheries, with about an equal number on shore, independent altogether of the Americans and French, the former being very extensive in their operations. This fish is preserved by pickling and is called green cod, or is dried; the latter being chiefly exported by British merchants to Spain, Italy, the West Indies, Britain, &c. Young cod abound in the mouths of the Thames and Medway, during the summer months and about autumn. They are from 12 to 16 inches in length; are caught by lines near the sand-banks; and when of the size of whitings are named codlings, and when larger Tamlin cod.

The adult fish is about 3 feet in length; head large; belly tumid; upper part of head, cheeks, back, and sides mottled with greenish ash-coloured spots; belly white; lateral line white; tail nearly square; *irides* silvery; the pupil blue. According to Mr. Yarrell, there are two varieties of the common cod; one with a sharp nose,

elongated before the eye, and the body of a very dark brown colour, being usually named the Dogger Bank cod. The other has a round blunt nose, short and wide before the eyes, and the body is of light yellowish ash-green colour, being frequently called the Scotch cod. Both kinds have the lateral line white, and they are considered about equal in quality. This fish sometimes attains a very large size, and Mr. Pennant records one that was 78 pounds in weight.

Uses. The flesh of this fish is white, flaky, free from oily matter and of good flavour; but in the latter quality, and in delicacy, it is slightly inferior to the haddock and whiting. It is also light and easily digested, which qualities belong to the whole of the *gadidæ* or cod family. A moderate sized fish is generally preferred, namely, one weighing from 10 to 15 pounds; and those are often selected which have the head small, body thick, flesh firm, and the skin blackish. It is in the highest state of perfection from the end of October to Christmas; but, during the remaining cold months, it is also of good quality. The flavour of the cod is said to be improved by being slightly salted for twenty-four hours before use; but certainly long salting destroys almost entirely this quality. Pickled or dried cod are much more difficult of digestion than the fresh fish. Several other parts of this fish are used as food, or for other purposes, besides the flesh. The swimming bladder or sound is salted, dried and packed in barrels. It is less fishy in taste than the flesh, gelatinous, and though not quite so nutritive is much relished by many persons. It is also converted into a kind of isinglass, which is stated by some authors to be of tolerably good quality. The tongue is salted and dried, being considered very delicate, with the exception of the root. The head contains the largest proportion of gelatinous matter, is highly esteemed by many individuals; but is regularly thrown overboard during the salting

process at sea, as it cannot be preserved. The roe is used to make caviar; and even the intestines are sometimes employed in the preparation of a particular dish. The liver, besides being eaten as food, furnishes a large quantity of valuable oil, which is used in various processes in the arts, namely, in currying leather, the manufacture of soap, &c. It is also used for burning in lamps, although it does not answer this purpose so well as spermaceti and whale oils, &c. It is prepared either by allowing the liver to run into a state of putrefaction, by which change the oil oozes out from its texture, or by heat and pressure, which latter process is superior, as the product is free from any putrid odour. When this oil exhales a fetid odour, this may be removed by adding to it a solution of chloride of lime, the lime being afterwards removed by diluted sulphuric acid, accompanied with gentle ebullition. This oil has also been employed for the cure of rheumatism, gout, scrophula, consumption, &c. for many generations, in several northern countries; and has lately been pretty strongly recommended by several German and British authors. It contains a minute portion of iodine, and its efficacy is supposed to depend on the presence of this substance. It has not, as yet, obtained the confidence of the profession. The dose recommended is from 2 to 3 ounces daily, to be continued for months. The inhabitants of Iceland and Norway consume a large quantity of cod-fish, and feed their cattle with the heads and bones.

THE HADDOCK.

Morrhua Æglefinus.—*Gadidæ.*—THE COD FAMILY.—This fish is nearly as valuable as the cod, and is found on all the coasts of Britain and Ireland. It has not been discovered in the Mediterranean, although it ranges north and south of this country to a considerable extent. It swims in immense shoals, and these are abundant on the

eastern coast from Yarmouth to the Tyne; but are somewhat uncertain in their appearance at the place they formerly visited. Haddocks are caught with lines, in the same way as the cod-fish; but sometimes with the trawl-net. They spawn in February and March, and the young are about six inches long in five or six months afterwards. Their food consists of small fishes, worms, &c., and when confined in ponds, have been known to take limpets from the hand. The length of the haddock is about 18 inches; weight from 2 to 4 pounds; but some have been found to weigh 14 and 16 pounds. Head, cheeks, back and upper part of sides, of a greyish-white colour; lower part of sides and belly, nearly white; the lateral line black; upper jaw much the longer; and under the first dorsal fin, but below the lateral line, there is a black spot, which was formerly supposed to be the impression of St. Peter's thumb and finger, when he took the tribute-money from the mouth of a fish.

Uses. The flesh of the haddock is white, tolerably firm, agreeable, light and very digestible. Those which are 2 or 3 pounds in weight, and full in the upper part of the sides, are in general the finest flavoured. They are in best condition for the table during October, November and December; but small haddocks are agreeable during almost the whole year. This fish is salted and dried like cod, and by this process its flavour and digestibility are much impaired. There is one method, however, of preparing haddocks by which these qualities are less injured than by the ordinary plans; namely, by slight salting, and subsequent exposure to smoke. Those prepared in this manner are named *Finnan* haddocks.

THE WHITING.

Merlangus Vulgaris.—Gadidæ.—The Cod Family.—The whiting is plentiful along the coasts of Britain and Ireland, and according to Mr. Yarrell, may be traced from

the Orkneys to Cape Clear. It is caught during almost the whole year, but is most abundant in January and February, at which period it approaches the shore to deposit its spawn. It feeds on young fishes, worms, crustaceous and molluscous animals, and is very voracious. Its usual size is from 12 to 16 inches in length, and about 1½ pounds in weight; but is occasionally found to weigh 3 or 4 pounds. Upper part of head and back, above the lateral line, is of a pale reddish ash-brown colour; sides and belly silvery white; no barbule at the chin, as in the cod, haddock, &c.

Uses. The flesh of the whiting is of a pearly white colour, tolerably firm, very agreeable in flavour, light, easily digested, and moderately nutritious, like that of the other members of the cod family. When dressed by boiling in water, it is exceedingly well adapted for convalescents and those who have weak digestive organs. Mr. Donovan states that whitings are finest in quality during summer, and are then brought to Gravesend in well boats. According to this author, a good whiting is firm, with brilliant silvery sides and strong fins. When large quantities of this fish are taken, as during winter, they are salted or dried; but their fine qualities are thus greatly deteriorated, and they become more difficult of digestion. Their flavour and digestibility may, however, be pretty well preserved for a week or two, during winter, by partial salting and moderate drying afterwards, in an airy apartment.

THE COALFISH.

Merlangus Carbonarius.—Gadidæ.—The Cod Family. —This fish is very abundant in the northern seas, the Baltic, and in the Orkneys, Hebrides, &c. It is a very voracious fish; and is taken very readily and rapidly with lines and bait. It spawns in spring, and after this period it is lean and inferior in quality for a considerable time. It is in best condition from October to December;

and is frequently caught along the British and Irish coasts. It has various provincial names; such as *sillock, podley, sethe, blockin,* &c. Its form is rather elegant; lateral line silvery white; upper part of head and back above the lateral line almost black, lighter below it; sides and belly greyish-white, with golden reflections; upper jaw rather the shortest; lips tinged with purple red; mouth black.

Uses. This fish, when of small size, resembles the whiting in qualities, and is considered very delicate; but when large its flesh is coarse, and is generally salted or dried. It forms, however, a valuable article of food for the poor, either in the fresh or dried state.

THE POLLACK.—WHITING POLLACK.—LYTHE, *Scotland.*

Merlangus Pollachius.—Gadidæ.—The Cod Family.—This fish is abundant on the rocky coasts of Britain and Ireland. It is also found in North America and the Indies. It is very frolicsome and is easily caught with a white fly. It spawns during winter, near the land; but is not gregarious, except in the pursuit of prey, such as the sandlaunce. The body of the pollack is elongated; lower lateral line incurvated and black; lower much longer than upper jaw; upper part of head and back olive-brown; sides and belly silvery-white, mottled with yellow and in young fishes reddish spots; length 18 inches; size about that of a haddock.

Uses. The pollack has frequently been mistaken for the whiting, and when young, its flesh has some resemblance to that of the latter, in whiteness and delicacy. They may be readily distinguished by the lower jaw being longest in the pollack and shortest in the whiting; while the lateral lines are also different in these two species, being curved and black in the first, and white and nearly straight in the second. When large or of full size, it is

considered coarse and insipid; but Dr. Richardson states, that good bread may be made from the roe. It is reckoned rather finer in flavour than the coal fish.

THE HAKE.

Merlucius Vulgaris.—Gadidæ.—The Cod Family.—The hake abounds in the northern seas and in the Mediterranean. It is most frequently found on the southern coasts of England; and Dr. Bushnan states that it is so abundant off the coast of Waterford, that one thousand fishes have been taken with the line, by six men, in the course of a single night. It is also very plentiful in the bay of Galway; but is rather rare in Scotland. It is not regular in its movements, but roves about in search of food, which often consists of pilchards. Mr. Yarrell states that he has seen seventeen pilchards taken from the stomach of a hake of ordinary size. Its season for spawning is from January to April; and it loses its voracity at this period. The length of the hake is about 2 feet; body elongated; dusky brown above; whitish beneath; inside of mouth and gill-covers black; eyes yellow; first dorsal fin triangular.

Uses. The flesh of the hake is coarse, insipid, and is eaten, in the fresh state, by the poorer classes. Large quantities are salted and dried on the northern shore of the Mediterranean. In this state it is exported to Spain, &c.

THE LING.

Lota Molva.—Gadidæ.—The Cod Family.—This large fish abounds in the Orkneys and Western Islands, and also on the British and Irish coasts. It is very tenacious of life, prolific and voracious; feeding on young fishes of almost every kind. It spawns during spring; and in Zetland the fishing season extends from May to August, while in Cornwall it is caught in January and February. The fishes are taken by hand-lines and long-lines; and

their favourite haunts are about the margins of the rocky valleys of the ocean. The ling is from 3 to 4 feet in length; but has been known to measure 7 feet, and weigh about 70 pounds. Body slender, elongated, roundish; gape large; upper jaw longer than the lower, the latter having a single barbule; back and sides greyish-olive; belly silvery-white; tail rounded, with a transverse black bar, the extreme tip white.

Uses. The flesh of the ling is rather coarse when eaten in the fresh state, but is excellent when salted; and is by many preferred to the cod in point of flavour. The fishes are split from head to tail, cleaned, salted in brine, washed and dried. They are afterwards exported to Spain and other Catholic countries, to be eaten during Lent. The air-bladders or sounds and roes are also pickled and used as food or for other purposes. The liver of this fish, like that of the cod, furnishes a quantity of fixed oil, which is employed for burning in lamps. It has also been used for the cure of rheumatism, &c., in doses of one or two ounces, and it is said to increase the perspiration, which becomes disagreeable in odour. Dr. Fleming states that the liver of this fish, when in season as food, is of a white colour.

THE TORSK OR TUSK.

Brosmius Vulgaris.—Gadidæ.—The Cod Family.—The torsk is chiefly found in northern seas; abounding among the Shetland and Orkney Islands. It approaches the land early in the year in shoals, lives in deep water and spawns in April or May. It is taken with smaller lines than the cod. It is not so large a fish as the ling, measuring generally from 18 inches to 2 feet in length, more rarely three feet. Body elongated; a single dorsal fin, extending the whole length of the back; ventral fins small and fleshy; one barbule at the chin; head of a dusky-brown colour; back and sides, yellow; belly, white.

Uses. The flesh of this fish is very firm, tough and

rather coarse; but in Iceland it is much used in the fresh state. When salted, however, it is considered excellent and superior to cod or ling, as it swells much during boiling and separates into thick flakes. It forms a considerable article of commerce in Shetland and other northern islands; and is exported to Spain and several Catholic countries.

THE PLAICE.

Platessa Vulgaris.—Pleuronectidæ.—THE FLOUNDER FAMILY.—The plaice belongs to the family of flat fishes, which are remarkable for their peculiarity of form, lightness and easy digestibility as food. It is common on the coasts of Britain, Ireland and Norway, &c. It spawns in February or March; and feeds on young fishes, soft marine animals, &c. It inhabits sandy banks and muddy shores, swims close to the ground like other flat fishes, and generally slowly in this situation. When pursued, however, it sometimes makes a rapid vertical movement, in order to escape danger. It is very tenacious of life; is taken with lines or trawl-nets, and sometimes in large quantities, but occasionally by a doubly-barbed short spear, heavily loaded, with a line attached to it. The plaice has been transferred to fresh water ponds, and has been found to thrive, as in Friesland. According to Mr. Yarrell, small plaice are named *fleuks* in the Edinburgh market. Its weight is generally 3 or 4 pounds, and is considered large when it weighs 7 or 8, but it sometimes attains that of 15 pounds; length about a foot. The body on both sides is smooth; several tubercles on the head, with a prominent bony ridge between the eyes; upper side of a rich brown colour, with a row of bright orange-red spots along the dorsal and anal fins and dispersed over the surface; under side white; tail rounded.

USES. The flesh of the plaice is white, tender, digestible, and moderately nutritive. Its flavour is not so much

admired as that of the turbot or sole, being more insipid; but it is a favourite with many persons. It is considered in the finest condition about the end of May. The best qualities are said to be taken on the coast of Sussex in England, in Ireland and in Holland.

THE FLOUNDER.

Platessa Flesus. — *Pleuronectidæ.* — THE FLOUNDER FAMILY.—This is a very common fish all around our British and Irish coasts; and is generally found in situations having a muddy or sandy bottom. It inhabits both salt and fresh water; and is often caught, in great numbers, in the brackish water at the mouths of our rivers, by a particular species of net called a tuck net. Flounders often ascend the rivers during floods; as in the Thames, &c. They are very tenacious of life, and are capable of living a long time out of water; so that their carriage from one place to another is very easily accomplished. They feed on small fishes, worms and aquatic insects; and spawn in February and March. The young flounder is discoverable by the end of April. There are frequent varieties of this fish; such as albinos, without colour on either side; and some are coloured on both sides. Its length is about a foot; weight from 1 to 2 pounds, but it is often smaller as well as larger in size, having been found to attain the weight of 4 pounds. Its colour is olivaceous or greyish, sometimes yellowish, whitish or variegated with brownish spots; the deepness of colour being supposed to depend, in some measure, upon the dark quality of the mud or clay that predominates in the situation it has inhabited; tail square. It is distinguished from the plaice by the rough or spinous lateral line.

USES. The flesh of the flounder is white, moderately firm, nutritious and very digestible. Its flavour is agreeable, and by some persons preferred to that of the plaice.

This quality is, however, much injured by keeping; and in small fishes the great number of bones is an objection to their use. The flounder is in good condi tion from May to Christmas, and the "sober coated grey-back" is generally preferred by cooks, to those variegated with scarlet star-like spots. This fish is generally very plentiful and cheap; and is consumed to a great extent by the middle and lower classes.

THE COMMON DAB.

Platessa Limanda.—Pleuronectidæ.—The Flounder Family.—This fish is abundant in the sandy bottoms of our British and Irish coasts, and is called in Edinburgh, *saltie* or *salt-water fleuk*. It feeds on small fishes, crustaceous and marine animals. It spawns in May and June, inhabits deeper water than the flounder, and is caught by sea-lines and hand-lines, but sometimes by nets. It is less common than the flounder, and somewhat smaller in size, but resembles it in shape. It is distinguished by its rough scales, its lighter brown colour, and its more incurvated lateral line. It rarely measures a foot in length, and the more common size is 8 or 9 inches.

Uses. The flesh of the dab is white, agreeable, digestible, and similar to that of the plaice and flounder. It is generally considered superior in flavour to both of these fishes, and bears carriage better than the latter. It is in best condition for the table during February, March and April.

THE HOLIBUT.

Hippoglossus Vulgaris.—Pleuronectidæ.—The Flounder Family.—The holibut is much less common in Britain than several other species of the *flat fishes;* but is very plentiful on the great banks of Newfoundland, in Norway, Iceland and Greenland. In some of these countries, it has been taken of the weight of 500 pounds.

Mr. Yarrell mentions one that was caught off the Isle of Man which weighed 320 pounds. It is generally taken with the line; but, according to Dr. Bushnan, it is sometimes harpooned off the coast of Norfolk. It feeds close to the ground on small flat fishes and crustaceous animals; and spawns in spring, the roe being reddish in colour, and the ova very numerous. Its usual length is more than 2 feet; form of body elongated, tapering towards the tail, and in this respect it differs considerably from the shape of the turbot; surface smooth; lateral line arched over the pectoral fin; colour above light and dusky brown; under side smooth and white; head small, mouth large; two rows of teeth in each jaw; eyes yellow.

Uses. The flesh of the holibut is white, firm and dry, the fibre coarse, and the flavour indifferent, being greatly inferior to that of the turbot; although Dr. Fleming remarks that it is generally sold for turbot in the Edinburgh market. The head and fins are said to be superior in flavour, and are often preferred. In Newfoundland, according to Mr. Audubon, the fins, with the parts adherent to them, are alone used; but as they are somewhat oily they must be difficult of digestion. The fleshy parts of the holibut, although nutritive and moderately digestible, are by no means so well adapted for those who have delicate digestive organs as several other white fishes. According to Mr. Yarrell, a large quantity of oil is obtained from the holibut caught in the Orkney islands. The inhabitants of Greenland eat this fish both in the fresh and dried states; the latter effect is produced by cutting the fish into long slices and exposing it to the air. The flesh of the holibut is generally prepared for the table in this country by cutting it into slices, and cooking it by boiling or frying; the latter process is recommended by Mr. Donovan.

THE TURBOT.—RAWN AND BANNOCK FLEUK.

Rhombus Maximus.—Pleuronectidæ.—The Flounder Family.—The turbot was known and highly esteemed by the ancients; and the *rhombus* of the Romans is believed to have been this fish. It is not so abundant on the Scottish as in more southern coasts; and there are considerable fisheries on those of Durham and Yorkshire. According to Mr. Yarrell, a large proportion of the turbot produced in the English market is taken on or near the sandbanks between the line of our eastern shore and the coast of Holland. It generally swims near the bottom, and is very voracious, using both agility and stratagem in securing its prey. It lives upon small fishes, crustaceous and molluscous animals, and is tenacious of life like the other members of the flounder family. It spawns about August, but is not out of good condition for any length of time. It is caught both with the drag-net and with lines, according to the season and situation of the fish; the line being used when the fish retires to deep water. It is very particular about the bait, such as the smelt; for if it be in the least degree tainted, it will not touch it. The Dutch are believed to furnish one-fourth of the whole supply sent to the London market, amounting, according to Mr. Yarrell, to £80,000 a year. The Dutch fishery commences about the end of March, and continues to the middle of August. The length of the turbot is upwards of 2 feet; its weight from 5 to 10 pounds, but occasionally it is found in our markets of 20 pounds weight. Mr. Yarrell mentions one that weighed 190 pounds, and measured 6 feet across the body. The upper or coloured surface of the body is studded with hard roundish tubercles; shape nearly round, exclusive of the tail; scales small; colour above brownish, of different shades; under surface smooth

and white; lateral line arched over the pectoral fin; eyes yellow.

Uses. The flesh of the turbot is white, moderately firm, readily digested, of a rich agreeable flavour; and it possesses this latter quality to a greater degree than any of the *flat fishes*. Mr. Donovan states that it has a little of the lobster-claw flavour, and the larger it is, within certain limits, the more it possesses these qualities; but a gigantic one is always tough and thready. The same Author has ascertained that the skeleton or bones of a turbot which weighed 9 pounds, amounts to 20 ounces avoirdupois in weight. Ude recommends a turbot to be kept for three days before use; this is, however, too long a period during summer. Many persons, however, consider its flavour improved by keeping for twenty-four or forty-eight hours. It is in good condition from April to September; and a fish of good quality ought to be "spongy under the slightest pressure of the fingers, and have a thick and cream-coloured belly."

THE BRILL.

Rhombus Vulgaris.—Pleuronectidæ.—The Flounder Family.—The brill is abundant on the southern and eastern coasts of England. It is frequently sold for the turbot; and resembles this fish in the kind of food it lives upon, and in its season for spawning. It seldom exceeds 8 pounds in weight; form of body rhomboidal; surface perfectly smooth, and, according to Dr. Fleming, "the soft smooth skin is the peculiar character of the species;" lower jaw the longest; eyes yellow; cheek and operculum smooth and without tubercles; colours of the body are various shades of brown, interspersed with pearl-like spots; under surface smooth and white. It is known by the various names of *pearl, kite, bonnet-fleuk*, &c. The fishing of the brill is conducted in the same manner, and in the same situations, as for the turbot.

Uses. The flesh of the brill is very similar in qualities to that of the turbot, but inferior in flavour. According to Mr. Yarrell, it is considered by some inferior to the sole, but very superior to the plaice.

THE SOLE.

Solea Vulgaris. — *Pleuronectidæ.* — The Flounder Family.—This fish is an inhabitant of our British and Irish coasts; and is also found in the Orkneys, the Baltic and Mediterranean. The soles of the north and east are inferior in size and flavour to those of the south and west. They are caught generally by the trawl-net; and immense numbers are transmitted from Brixham and Torbay in Devonshire to the London market. They are gregarious, spawn about the end of February, and are for a few weeks soft and insipid, but they soon recover their healthy condition. They feed on testaceous animals, the spawn and fry of other fishes, &c.; and are capable of living, thriving and breeding in fresh water. The length of the sole is from 1 to 2 feet; weight from 1 to 2 pounds; but it sometimes attains that of 7, and Mr. Yarrell mentions one that weighed 9 pounds. The upper jaw is the longest; both jaws furnished with minute teeth only on the under or white side; body of an oval shape, pointed towards the tail; upper side of a dark brown colour; scales small, rough and ciliated at the edges; tip of pectoral fin black; under side white.

Uses. The flesh of the sole is firm, white, nutritive, digestible, and possesses a very superior flavour, which many prefer to that of the turbot. It is in season during almost the whole year, except a few weeks after spawning; and, according to Mr. Yarrell, the soles procured in deep water are the finest in quality. Mr. Donovan states that a "good sole is known by its under parts being cream-coloured, and its body thick and firm."

THE COMMON EEL.—THE SHARP-NOSED EEL.

Muræna Anguilla.—Muræniдæ.—THE EEL FAMILY. —The common eel is abundant in our rivers, ponds and lakes; and is found in almost every part of the world. Eels are very tenacious of life, easily preserved, and it is stated that they may be kept alive in cisterns without food and in good condition for months. They occasionally leave the water, and travel over wet meadows in search of frogs and other kinds of food, or for the purpose of getting into an adjoining river or pond. They migrate to the sea during autumn for the purpose, as is generally believed, of depositing their spawn, and this is confined to adult eels. The young eels, about three inches long, proceed in myriads from the sea to the mouths of rivers in the spring months. Eels are extremely sensible of cold; and none are found in the Arctic regions, the rivers of Siberia or the Wolga and Danube. During the cold months of the year, they remain imbedded in mud; and great quantities are frequently taken by eel-spears, in the soft mud of harbours and banks of rivers, during the recession of the tide. They are capable, however, of being actually frozen without losing their vitality, provided they are gradually thawed, first by snow and then by cold water.

They seem to be also very sensitive of electricity, for they are restless during thunder storms, and are at these times often taken in great quantities, by gratings, boxes and baskets, which confine all that enter them. It was believed by the ancients, and even by some of the moderns, that eels were viviparous; but the best authorities now consider them oviparous, like other very prolific fishes. They spawn early in spring, and this sometimes occurs in fresh water, although generally in the sea. The eel is very voracious, during spring and summer, feeding on the larvæ of various insects, young fishes,

and occasionally vegetables. It is a fish of slow growth and does not mature its roe until the second or third year. The fishery of eels is carried on pretty extensively in the Thames and other rivers, by means of an apparatus composed of a series of wicker-baskets, and in their descent to the sea, during the autumnal months, the eels entering it are entrapped. They are also killed by a three-pronged spear, which is thrust into the mud, and by other contrivances. London is chiefly supplied with this fish by the fishermen of Holland, who bring them to this country in well boats. Its length is from 1 to 3 feet; the weight varies considerably, but it sometimes attains a large size. Mr. Yarrell records one that weighed 27 pounds. Eyes small, placed immediately over the angles of the mouth, of a reddish-yellow colour; lower jaw the longest; both jaws furnished with small teeth; upper surface of a dark olive-green; the sides lighter; belly white. When the fish is an inhabitant of pure rivers or streams, the sides and belly are silvery-white and subtranslucent, and it is called the silver-eel. On the other hand, if the water have a muddy bottom, its colours are brown and dusky.

Uses. The flesh of the eel is gelatinous, much impregnated with oil, and its flavour is in general considered very agreeable. It is very nutritive, but difficult of digestion, being liable to occasion nausea, vomiting, diarrhœa or other derangements of the stomach and bowels, in those who have delicate digestive organs. Young eels, according to Mr. Yarrell, are taken in the Severn in great quantities with sieves of hair-cloth, or even with a common basket, and after being scoured and boiled are offered for sale. They are either fried in cakes or stewed, and are accounted very delicious. Eels are in season during almost the whole year; the silver eel is reckoned the most delicate, and those weighing from $\frac{3}{4}$ to $1\frac{1}{2}$ pounds are preferred, according to Mr. Donovan. The eel is sometimes the subject of cruel tortures, in order to satiate

the appetite of the gourmand. M. Ude's formula for an eel-matellote is the following: "Take two or three live eels, throw them into the fire, and as they are twisting about on all sides, lay hold of them with a towel and skin them." The fat of eels was formerly used as an application to wounds, hemorrhoids and as a cure for deafness. The oil of eels has been used for small machinery, as it is little liable to grow thick by exposure to the air.

THE CONGER.

Conger Vulgaris.—Muræenidæ.—THE EEL FAMILY.—This eel is found only in the sea, and is frequently met on the rocky coasts of Britain and Ireland. It is very abundant in Cornwall, where the principal fisheries of the conger are established. It is very tenacious of life, and is frequently found alive among rocks, having been left by the retiring tide. The spawning season occurs during December or January. The conger possesses great strength, is extremely voracious, devouring small fishes, testaceous animals, and even its own species. It sometimes acquires a very large size, and Mr. Yarrel mentions specimens that weighed from 80 to 130 pounds, and which measured 10 feet in length, and 18 inches in circumference. The conger is caught with lines baited with small fishes, the most esteemed being the sandlaunce or pilchard, and the fishery is conducted during a dark night, when one or two tons are sometimes taken by three men. The length of the conger is about 5 feet; upper jaw the longest, both being furnished with strong teeth; mouth deeply divided; eyes large and silvery; margin of the dorsal and anal fins black; lateral lines nearly white; upper parts of body of a pale brown colour; beneath whitish.

USES. The flesh of the conger is similar in qualities to that of the common eel, being moderately agreeable, very nutritious, but difficult of digestion. The young eels are more tender, and are therefore preferable to those

of large size. Mr. Donovan states that a fish weighing 12 pounds is considered small. It is little used and little esteemed as food in this country, except by the lower classes, from its low price. It is sometimes dried and exported to Spain, where it is reduced to powder, and employed to thicken soups or for making ragouts.

THE SAND EEL.—*Ammodytes Tobianus;* and the SAND-LAUNCE.—*Ammodytes Lancea*—belonging to the family *Anguillidæ*, are small fishes, the first being about 12 inches long, and the second measuring from 5 to 7 inches. They are characterised by the dorsal and anal fins being separated from the caudal fin, by an elongated head and body, and a forked tail, &c. They are generally used as an excellent bait for other fishes, particularly the sand-launce; for it is the most common, and its colours are bright and silvery. On some parts of the coast, these eels are eaten, and considered "delicate food." Dr. Bushnan states that they are consumed in vast numbers during summer by the inhabitants of the Hebrides.

THE COMMON STURGEON.

Acipenser Sturio.—Sturionidæ.—THE STURGEON FAMILY.—The sturgeon is very common in Asia, in some northern countries of Europe, also in North America, and at Albany its flesh is named Albany beef. It is comparatively rare in the British isles. It is generally caught in estuaries, and rarely in the sea, where it is believed to inhabit deep water. In this country it is occasionally taken in the Almond and Esk; and generally in a salmon-net to which it often does considerable damage from its large size, though otherwise harmless and timid. The sturgeon has been found in the north, south and east coasts of Ireland. It is oviparous, and spawns during winter. It is believed that as soon as the young have escaped from the eggs, they descend to the sea, and only return for the purpose of spawning. It feeds upon insects

and sea plants. The sturgeon is a large fish, being about 8 feet in length, and weighing from 100 to 200 pounds. Mr. Pennant has recorded one which weighed 460 pounds. The body has an elongated somewhat pentagonal shape, having five longitudinal rows of flattened plates along the back, sides and belly, with pointed central spines directed backwards; nose pointed and long; mouth small and situated on the under surface of head, without teeth; eyes small; four cirri between mouth and end of nose. The body has a brownish or greenish colour; plates nearly white; belly silvery white.

Uses. The flesh of the sturgeon is whitish, firm, compact, and is said to resemble veal. Mr. Yarrel states that "the flesh, like that of most of the cartilaginous fishes, is more firm and compact than is usual among those of the osseous families." It is very nutritive, and resembles animal muscle in containing a considerable quantity of alimentary principles, in proportion to its weight. Although not so light, tender and digestible as some other fishes, such as the whiting, haddock, cod, flounder, turbot, &c., it is readily assimilated by a healthy person, and is very wholesome. The flesh is used as food in two states, namely, when fresh and pickled, and the latter is considered a great delicacy, and sent all over Europe. Mr. Donovan remarks that "slices of sturgeon merely dressed in the manner of a veal-cutlet, are only to be distinguished from the latter by the superiority of the meat, and a certain superadded flavour, which appears most to resemble that of the scallop shell-fish, and which exists barely in a recognisable degree. This resemblance to veal is equally observable in the appearance of the flesh both raw and fried, as well as in the taste. It is usual to make sturgeon pies, and these are scarcely distinguishable from meat-pies. Were animals to be classed according to their qualities as food, the sturgeon would certainly be separated from the fishes,

and placed among the land animals." The same Author remarks that this fish is in season during the winter quarter and part of spring, and that when good it is firm and without flabbiness. Its flavour is not considered good when boiled, it is therefore generally roasted or baked. The flesh of the sturgeon is preserved by two methods. The first consists in cutting it into long pieces, salting, and then hanging them in the sun to dry. The second, which is usually practised in Holland and along the shores of the Baltic, is accomplished by cutting the fish across into short pieces, and putting these into small barrels, along with salt, &c., by which plan the flesh acquires a reddish hue.

ISINGLASS.—This substance is the prepared sound or swimming-bladder of this as well as other species of sturgeon, but chiefly, it is stated, of the *acipenser huso*. In the Russian sturgeon fisheries, on the shores of the Caspian, the roe and sounds of the fish are the parts generally preserved, the rest being thrown away. The swimming-bladder is converted into the isinglass of commerce in the following way. It is cut open when fresh, washed and freed from its outer membrane, exposed for a short period to the air, and then formed into rolls about the thickness of the finger. This is afterwards divided into threads or shreds by machinery, to render it more quickly soluble. It is also dried in the unfolded state, and forms leaf isinglass. Isinglass consists nearly of pure gelatin, with some saline matters. It is well known in many of the arts, and is used for refining malt liquors, wines, &c.; and it practically answers every ordinary purpose for the clarification of coffee. It is used in the manufacture of court plaster and as a cement. As an article of aliment it is light and easily digested, and, notwithstanding the doubts which have been thrown upon the nutritive qualities of pure gelatin by the French experimenters, experience has proved that by the usual

methods of combination with other alimentary bodies adopted in this country, it is capable of supplying to man a moderate amount of nutriment. It is well adapted for convalescents, and those labouring under chronic ailments, especially affections of the stomach, or in diseases accompanied with a weakened state of the digestive organs. It is frequently prepared by boiling with milk; but when the latter disagrees with the individual, water may be substituted. ½ ounce of isinglass, boiled with 16 ounces of water, will form a pretty consistent jelly, which may be flavoured with sugar, salt, wines or aromatics. Isinglass is employed in various processes of cookery, in making blanc-mange and creams, and is occasionally converted into a substitute for calves-feet jelly, to which it has an intimate resemblance when similarly flavoured. A tolerably good isinglass is prepared from other fishes, such as from the sounds of the cod, white dolphin, &c. Isinglass ought to be white, and completely soluble in water.

PATENT GELATIN—is prepared from bones, and is very similar in properties to isinglass, for which it is often substituted.

CAVIAR.—This is another substance of considerable commercial value, which is obtained from the common sturgeon, as well as from other species. The trade is chiefly carried on by the Russians in the river Wolga and the Caspian sea. In preparing it for use, the roe is removed from the body of the female fish, freed from the membranes that connect it together, washed with vinegar, spread upon a table to dry, put into a vessel along with salt and broken with the hand, drained in a canvas bag, pressed and put into kegs, and sometimes it is formed into small cakes. Caviar has somewhat the consistency of soft soap, and a brownish colour; but few persons in this country like its flavour, or use it in any form, although at one period it was found at the

tables of the wealthy. It is extensively used in Russia during Lent and fast-days, and is exported to Turkey, Greece, Italy, &c. Dr. Willich states that caviar is a nourishing food, and more easily digested than pickled salmon, resembling in taste and nutritive properties the essence of anchovies. According to Mr. Donovan, it is eaten with bread, either without preparation or mixed with a little vinegar.

Dr. Bushnan mentions another economical substance procured from the sturgeon, namely, "the ligamento-cartilaginous cord which pervades the spine," being a Russian delicacy named *vesiga*.

THE SKATE.

Raia Batis.—Raidæ.—The Ray or Skate Family.—The skate or ray is somewhat singular in appearance, being rhomboidal in form, depressed or flat in the body, and possessing a long spinous tail. It is not furnished with a true head and neck, and the nostrils, mouth, &c., are on the under surface, while the eyes are placed above. Its movements are generally slow, being something between a sliding and swimming motion. It is a very voracious fish, feeding on molluscous or crustaceous animals; and the muscles of the jaws are so powerful that it is able to crush the shell of a crab. The species here noticed as the skate, has also been named the *true skate, blue skate, grey skate*, and is very common on the coasts of England and Scotland, the Orkneys, &c.; although others of the ray family are more frequently taken, such as the *thornback* and *homelyn*. The females are more numerous and larger than the males, and both are furnished, when full-grown, with sharp teeth. It sometimes attains a very large size, and Mr. Pennant mentions one which weighed 200 pounds. Skin rough; three rows of spines on the tail, the points of those in the lateral rows directed forwards; snout conical; upper sur-

face of body and tail of a greyish-brown colour; under surface "sooty-white," with dark lines and numerous blue specks and sharp points intermixed. The skeleton consists of cartilage; its bones are therefore soft, and are sometimes eaten along with the flesh. It is distinguished from the long-nosed skate, which it resembles in colour, by the nose of the latter being of great length, narrow and sharp. In spring, and the early part of summer, the skate deposits its young, which are enveloped in horny cases, named purses in some parts of the country; and when sufficiently matured, they escape for the purpose of providing for themselves. It is generally caught with the trawl-net.

Uses. The flesh of the skate is relished by many persons, being considered delicate and well-flavoured. On some parts of the coast it is only used as a bait for crabs and lobsters. It is, however, wholesome and nutritious; although a little more difficult of digestion than some other white fishes, such as the cod family, the flesh being somewhat condensed. It is in best condition for the table during autumn and winter; but young fishes may be eaten throughout the whole year. In some parts of the country the fish is hung up for two or three days, until it is dry and exhaling an ammoniacal odour; and its flavour is thus supposed to be improved. It is prepared for the table by boiling, frying, &c.; and is a favourite with many when eaten cold with mustard, vinegar and peppers. The esteemed parts of the skate are said to be improved by the process named crimping. The oil procured from the liver of the skate has very lately been introduced as a substitute for cod-liver oil, being recommended by some writers as fully more agreeable and efficacious in the cure of scrophulous and other diseases. According to Mr. Yarrell, this species is better than the thornback or homelyn as an article of food.

THE LAMPREY.

Petromyzon Marinus.—*Petromyzidæ.*—The Lamprey Family.—This cartilaginous fish is considered the lowest in the scale of vertebrated animals, and, like the rays and sharks, is not furnished with a swimming-bladder. It is very powerful, and by attaching itself to large stones, by means of its lips used as a sucker, it can remove them to another situation. It spawns late in the spring, the roe being produced by both sexes; and is found in most of the rivers of Europe, the Mediterranean, the Arctic regions, North America, &c. It is common in the Severn, the lampreys of which are celebrated for their fine quality. Its food consists of any soft animal matter; and in the sea it fastens on large fishes, eating the soft parts with its small teeth. It is generally taken in rivers, and more rarely in the sea. It is, like the eel to which in some respects it bears a resemblance, very tenacious of life. Its length is generally from 20 to 28 inches; head rounded; mouth circular; body long and cylindrical, like that of an eel; teeth small, numerous and tubercular; skin smooth; body of an olive-brown colour, mottled on the back and sides with green and brown spots. It swims with an undulatory motion, assisted by its fins; but in rapid currents its progression is effected by successive plunges forwards to any fixed object to which it can attach itself.

Uses. The flesh of the lamprey is white, soft, oily and nutritious, but difficult of digestion, and not suited for delicate individuals. Its flavour is considered delicious when in season, namely, in April and May. It is recorded that Henry I. of England died of a surfeit of lampreys; and the Romans bestowed much attention to the rearing and cooking of these fishes. Those of a large size, such as 2 or 3 pounds in weight, are said to possess the finest flavour. Mr. Donovan states that a

long-continued heat is required for cooking the lamprey. Lamprey-pies were at one period famous, particularly at Gloucester; and, according to Mr. Yarrell, the potted lampreys and lamperns of Worcester are at present in high estimation.

THE RIVER LAMPREY or LAMPERN—*Petromyzon Fluviatilis*—is abundant, and a permanent resident in many of the rivers of Britain and Ireland. It possesses similar dietetic properties with the marine lamprey, already described.

TESTACEOUS ANIMALS.

THE COCKLE.

Cardium Edule.—Cardiadæ.—THE COCKLE FAMILY.—The cockle is abundant on our coasts, and is found on sandy shores near low water-mark. The shell is globular or heart-shaped, about 2 inches in diameter, with about 26 ribs, sulcated transversely.

USES. The cockle is an agreeable, digestible and moderately nutritive aliment, either in the raw state or when scalded; but when long boiled, it is rendered tough and more difficult of solution in the stomach. Cockles are in season during the spring months, and "the largest have as fine or a finer flavour than the small." (Donovan.)

THE OYSTER.

Ostrea Edulis.—Ostreadæ.—THE OYSTER FAMILY.—The oyster is an important article of commerce in Britain; and, independent of the immense quantities consumed in this country, is exported to Hamburgh, Holland, France, Belgium, &c. It is bred in "oyster-beds" in many of the rivers of England; and in

Essex these are numerous, and the oysters excellent. It is very prolific, spawns in May, and the ova, which resemble drops of tallow, adhere to stones or other hard bodies. About this period the fishermen are allowed to take the spawn thus deposited, and transport it to other *beds* previously made in ponds, and furnished with sluices, through which the sea-water flows at spring-tides. The water, being stagnant, acquires a greenish hue, and communicates this colour to the oysters, by which their commercial value is enhanced. Three years are required to bring them to maturity, or to render them of a proper size, delicate and fat. In Scotland, this mode of rearing oysters is not adopted; but they are procured from their native rocks, and though considered inferior by some persons to those artificially bred, are, in many cases at least, equal in quality.

According to Pliny, artificial beds of oysters were first established by Sergius Arata on the Lucrine Lake; and the Romans were accustomed to ice their oysters before bringing them to table. Shell bivalved; of a roundish-oval shape, with scaly foliations; the upper valve less, and flattened; inner margin entire; but the shape is various, according to the locality of the oyster. Oysters adhere to rocks and other foreign bodies by their most convex valve. They are taken from their beds by the process named dredging.

Uses. Oysters are in the finest condition for the table from September to April; but, according to some authorities, from August to May. In England, the Colchester oysters are famous; while the "whiskered Pandores" of Edinburgh are little less so. The fresher they are the finer is the flavour; but when closely packed in a barrel, or dropped into a bottle along with their juice, may be kept for eight or ten days. They may also be preserved for some time in a solution of common salt. Oysters have always been considered a great alimentary

delicacy. They are light, moderately nutritive and easily digested; although they disagree with some persons of delicate digestive organs. They are used in various states, namely, raw, stewed, grilled, pickled, &c.; but they are certainly most digestible when eaten in the first state, along with their natural juice. A very moderate application of heat may be advantageous in some cases, such as will not harden too much their albuminous constituents. Some aromatic condiment, such as one of the various kinds of pepper, may be used as an accompaniment.

THE SCALLOP—*Pecten Maximus*—is also found on many parts of the British coast, and is esteemed for the delicacy of its flavour. Mr. Donovan considers it one of the finest of our shell-fish, and remarkable for the sweetness and purity of its flavour.

THE MUSSEL.

Mytilis Edulis.—Mytilidæ.—THE MUSSEL FAMILY.—The mussel is gregarious, very abundant on the British coasts on hard ground above low water-mark. It is extremely prolific, and is destroyed in immense numbers by the crab, crayfish, &c. It is furnished with a strong beard, by which it attaches itself to rocks, &c., and is thus prevented from being dashed against foreign bodies, or thrown upon the beach to perish. Mussels, like oysters, may also be bred in salt-water marshes or ponds; and a year is required for "peopling the bed." They are taken from their beds from July to October. The shell of the mussel is longitudinal in form, sometimes 5 inches in length and 2 in breadth, though generally smaller; colour bluish-black, with dusky yellowish radiating lines; inside whitish; margins of a blue colour; hinge many toothed. The shells being joined by a muscular ligament, can be opened by the animal to a small extent.

Uses. The mussel is similar in alimentary qualities to the oyster; being, however, less tender, agreeable and digestible, but equally nutritive. It is considered rich and in season during autumn; but inferior and deleterious during spring, according to some authors. Mussels have been on many occasions known to produce poisonous effects; but this point will be noticed under the article *Poisonous Fishes*. Mussels are eaten both in the fresh and prepared states, and are also pickled. A moderate application of heat renders them more agreeable, and not more difficult of digestion. The mussel is also extensively employed as a bait for other fishes.

THE EDIBLE SNAIL.

Helix Pomatia.—Helicidæ.—The Snail Family.—This molluscous animal was known and esteemed as an article of food by the ancients. The Romans cultivated snails with great attention, and reared them in receptacles named *cochlearia;* which were generally constructed under rocks or eminences moistened by a running stream, or if not so situated, water was artificially supplied by a water-pipe. In ordinary cases they were allowed to provide food for themselves, by crawling about the floors of their prison, but when it was desirable to fatten them, they were fed with bran and sodden wine, under which treatment, as recorded by Varro, they and their shells would enlarge so much that each of the latter could contain ten quarts! The snail rarely attains a large size in this country. It is supposed that the common land or garden snail was introduced into Britain about the middle of the sixteenth century; but it is now very common, and sometimes destructive to trees and other vegetables. The shell is about two inches in diameter, inflated, yellowish-brown, wrinkled transversely, with 5 rounded whorls; but there are two varieties. The animal has a dusky-grey colour; deposits from 25 to 50 ova; and about

the end of autumn it digs a hole in the earth with its foot, into which it retires, after having closed the aperture in the shell with mucus and a calcareous secretion. It remains torpid in this situation during winter, and is revived by the heat of spring.

USES. The snail is used to a very limited extent in this country as aliment, its appearance generally exciting feelings of disgust; but on the Continent of Europe it is extensively employed during Lent. Snails are frequently taken in the woods and hedges; but in Switzerland they are reared in great numbers for exportation. They are moderately nutritive and digestible, resembling the oyster in dietetic qualities; but in whatever way prepared their disagreeable slimy properties adhere to them. On the Continent they are cooked by boiling, frying, &c., sometimes stuffed with forced meat, and are seasoned with pepper, salt, oil, &c. At one period they were celebrated as an article of diet for consumptive persons; and as an application to various swellings, abscesses, &c.

CRUSTACEOUS ANIMALS.

THE CRAB.

Cancer Pagurus.—SECTION *Brachyura.*—The common crab inhabits all the shores of Britain and Ireland, is gregarious, lurks under sea-weeds and burrows in the sand. It swims with difficulty, but can walk at the bottom of the water with considerable speed. It is very pugnacious, fights with great energy, and being little conscious of pain is sometimes killed or loses a limb, either by the power of its adversary, or by seizing its own by mistake; but this member is speedily regenerated to nearly its former size. It

casts its shell annually, and the animal is thus for a time left in a defenceless condition, becoming the easy prey of many kinds of fishes. When full-grown the crab weighs about 7 pounds, but it is sometimes considerably larger. Crabs are caught in wicker-baskets, baited with garbage. The shell is of a reddish or greenish-colour, more red after boiling, wide, smooth above; claws encrusted, large, smooth; fingers studded with tubercles. The shell or envelop is, like that of other crustaceous animals, chiefly composed of carbonate of lime.

Uses. The flesh of the crab is agreeable in flavour, firm and white in the claws, reddish white and softer in the body, nutritive and moderately digestible. It frequently, however, disagrees with those who are subject to attacks of indigestion; and the flesh of the great shell is considered most liable to produce such effects. Crabs are in the finest condition from March to October, and are prepared for the table by gradual and slow boiling in sea-water or water containing common salt. They are also used in the formation of soups, and from the quantity of gelatin and albumen they contain, are considered nutritious; but these are rarely employed in this country.

THE LOBSTER.

Astacus Marinus.—Section *Macroura.*—The lobster inhabits almost all the seas of Europe, and is common in Britain, Ireland, the Orkney islands, &c., being often found at the bases of rocks. It is abundant and of excellent quality on the coasts of Scarborough and Northumberland. Lobsters are very prolific, and the ova are deposited under the tail of the female, which is generally broader than that of the male. They are very pugnacious, run with great rapidity in the water upon their legs and small claws, and if alarmed by an enemy can spring tail forward to the distance of thirty feet, and almost as swiftly as a bird can fly. Loud noises,

such as thunder claps or the roar of cannon, cause them sometimes to lose their claws, which are afterwards, however, partially regenerated. The lobster, like the crab, changes its shell or crustaceous covering once a-year, and is for some time defenceless and in a state of great weakness. It is very voracious, and feeds on sea-weeds, garbage, &c. It sometimes attains a very large size, and has been found from 18 inches to 2 feet in length. Its colour is bluish-black when alive; but when boiled it becomes reddish-coloured. The point of the anterior extremity of the shell has three teeth on each side, and a double one at its base; the anterior claws are large and unequal, the largest finger of the forceps is oval. Lobsters are caught in wicker-baskets formed like a mouse trap, and baited with garbage. In summer they approach near the shore, and are found in about 6 fathoms water; but during the winter months they retire to the depth of 12 or 15 fathoms.

Uses. The flesh of the lobster is firm, white, nutritious, of a pure and agreeable flavour, moderately digestible, especially what is contained in the claws. It ought, however, to be eaten sparingly by those who have delicate digestive organs, particularly if not fresh. Lobsters are prepared for the table in various ways, namely, by boiling, roasting, baking, &c., and also in forming a light nutritious soup. On account of their superior flavour, they are employed in the formation of a fish sauce. They are in good condition from March to October; but small lobsters may often be used during the whole year. According to Mr. Donovan, those which are heavy for their size, hard in the sides of the shell, with the adherence of small marine animals to it, are to be preferred; and males are superior to females. In Germany lobsters are often boiled alive in milk.

THE CRAW-FISH.

Astacus Fluviatilis.—Section *Macroura.*—This species of lobster inhabits fresh water, and is found in many of the rivers of this country as well as in those of the Continent of Europe. Cray-fish abound in the river Obra in Silesia, and in the Don in Muscovy, and are collected on the banks to putrefy, for the purpose of extracting the stones or concretions contained in their stomachs. These concretions consist of carbonate of lime, and are named crabs' eyes or crabs' stones, being considered useful for neutralising acidity in diarrhœa, &c. They are very voracious, feed on fishes, small mollusca, and devour flesh and dead carcases very greedily. They are frequently found in some of our rivers lodged in holes formed in the clayey banks, and are caught by means of sticks split at the end, with a bait inserted in the cleft. The snout of the craw-fish is projecting and slightly serrated; thorax and back smooth, the latter having two small spines on each side; claws large, beset with small tubercles; tail consists of five joints. When alive it is of a greenish-brown colour; when boiled, red, to which rule there are some exceptions. In size, and in general habits, it resembles the lobster.

Uses. The flesh of the craw-fish is similar to that of the lobster; but is generally considered coarser, although equally nutritious and nearly as digestible. Soup made from it was at one period famous for the cure of consumption, hectic fever, cancer, &c.; but it can only be considered useful in these diseases as a light nutritive article of diet. It is variously dressed for the table, namely, by boiling, baking, &c., but the principal parts which are eaten are the flesh of the claws and tail. When the craw-fish feeds on ill-flavoured food the flesh becomes tainted, and those found in stagnant waters are inferior to river cray-fish. It is in best condition for the table during the summer months.

THE SHRIMP.

Crangon Vulgaris.—Section *Macroura.*—This small crustaceous animal is very common on the shores of Britain, and over all Europe, and is frequently caught in large quantities at the mouths of rivers. It has a pale greenish colour when alive; but, like many other crustaceous animals, becomes red by boiling. Feelers long and slender; claws with a moveable single hooked fang; seven joints in the tail; three pairs of legs; middle caudal fin subulated; the four others rounded and fringed.

Uses. The flesh of the shrimp has a very agreeable or rather delicious flavour, and is more delicate than that of the large crustaceous animals, such as the crab, lobster, &c. Shrimps are prepared for the table by boiling, baking, &c., and frequently employed in the formation of a very agreeable and much esteemed sauce. Restorative soups are also made of shrimps and prawns.

THE WHITE SHRIMP.

Palæmon Squilla.—Section *Macroura.*—This animal resembles in appearance and properties the common prawn; and it has received its name from becoming white or ash-coloured after boiling. It inhabits the coast of Kent and is sent to the London market. When full-grown it is about the size of the common shrimp, and about half that of the common prawn.

THE PRAWN.

Palæmon Serratus.—Section *Macroura.*—The prawn is common on some of the shores of Britain; is found among loose stones, but swims well and is occasionally taken at sea at the depth of thirty fathoms of water. It is ash-coloured when fresh; but assumes a fine red after boiling. Snout serrated and bent upwards, three pairs of filiform feelers; claws small, with two fangs; thorax

smooth; five joints in the tail; middle caudal fin subulated, two outmost flat and rounded.

Uses. The flesh of the prawn is similar to that of the lobster or craw-fish; but esteemed more delicate, although inferior in this respect to the shrimp. It is prepared for the table by boiling, baking, &c.

POISONOUS FISHES.

Few if any of the fishes which inhabit our British coasts are poisonous, although oysters and mussels produce deleterious and sometimes fatal results, at particular times or seasons, but the occurrence is rare. The circumstances upon which this depends, have not hitherto been discovered; and it would serve no useful purpose to enumerate the unsatisfactory explanations which have been given to account for their occasional poisonous properties. The mussel has most frequently given rise to these effects, which consist of uneasiness or pain in the region of the stomach and bowels, nausea, vomiting, heat and constriction of the throat, difficult breathing, numbness of the mouth and extremities, great debility of the whole body, &c. A peculiar eruption, resembling nettle-rash, is sometimes the result. The Great and Lesser Weever, *Trachinus draco and T. vipera*, which are caught on the British coasts, are also supposed to be poisonous. This opinion is doubtful; for the effects are confined to the stings or wounds inflicted by the dorsal fins or opercular spines, and may either be the result of a poison contained there, or the inflammation, &c., which follow may be induced by the peculiarity of the wound. The flesh of these two fishes is, however, admitted to be wholesome; and Mr. Yarrell characterises that of the larger weever as excellent. In the West Indies and other tropical countries, many fishes are enumerated as poison-

ous ; such as the Yellow-billed Sprat, *Clupea thyrsa ;* the Baracouda, *Perca major;* the Sword-fish, *Xiphias gladius ;* &c. With the exception of the first named fish, considerable doubt exists regarding the poisonous properties of the others ; and farther observations or experiments are required upon this subject.

When poisonous fish has been swallowed emetics should in the first instance be exhibited, so as to evacuate thoroughly the contents of the stomach. The subsequent treatment must be regulated by the circumstances of the case ; but when there is much sinking of the powers of life, stimulants are generally required.

SPOILED OR DECAYED ANIMAL FOOD.

Animal substances undergoing the process of putrefaction, are well known to produce deleterious consequences when taken as food. Exceptions to this rule sometimes occur ; and certain tribes of savages can from habit live upon putrid oil, blubber, offal, &c. Accidents from the use of animal food in a state of decay rarely occur in Britain ; but many have occurred on the Continent, particularly from spoiled cheese, German sausages and bacon. An account is given in Hufeland's Journal of nearly 500 out of 600 people, who attended a fête, at Andelfingen in the Canton of Zurich, in June 1839, being poisoned with cold roast veal and ham ; and among this number four persons died.*

Dr. Roeser gives an account of eight persons who were poisoned by sausages at Limmetshousen, prepared from the liver of a healthy pig, eight days before. The sausages had a peculiar taste, and one individual did not partake of them on this account. Three out of the eight persons died.† The symptoms,

*Edinburgh Journal of Medical Science, August, 1842.
†Edinburgh Medical and Surgical Journal, January, 1843.

in almost all these cases of poisoning are very similar: the most prominent being great irritation of the stomach and bowels, great weakness and coldness, feeble pulse giddiness, sometimes delirium, and in fatal cases convulsions. The nature of the poison has not been exactly determined; but it has been rendered probable that it consists of a fatty acid soluble in alcohol. The poisonous sausage includes both the white and the bloody varieties. They are large, and the materials are contained in swines' stomachs, are soft, have a nauseous taste and a putrid odour. Those only are poisonous which have been boiled before they were salted and hung up, and at a particular period of decay; for when putrefaction has advanced, so that sulphuretted hydrogen is produced, they cease to be so. The poison is most liable to exist in the centre of the sausage. Cheese which becomes poisonous is chiefly manufactured in some of the German States; but Dr. Christison is of opinion that a similar poison is occasionally met with in Cheshire, among the small farmers, when the curd is kept too long before a sufficient quantity is accumulated. These cheeses cannot be recognised by any precise characteristics. In this country, bacon is rarely if ever known to produce poisonous effects, perhaps from the mode of curing it; but in France, such have repeatedly occurred. Spoiled goose-grease, smoked sprats and putrid pickled salmon have also been known to produce deleterious effects. The foregoing facts show the necessity for great attention in the curing of all kinds of animal food, fishes, &c., which are intended to be kept, for it is highly probable that the poisonous properties of the substances mentioned, might be thus effectually prevented.

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